RAILROAD GAZETTE

FRIDAY, MAY 23.

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Contributions.

Burnt Clay Ballast.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In some parts of the West the question of suitable ballast is a serious matter. The majority of prairie roads when first completed were only ballasted with the natural soil, it being black loam, sand or clay as the case might be. The consequence was that in wet weather these materials were more or less washed away, and in the winter the frost would have the effect of heaving the ballast and track out of line, thus in either case preventing a perfect alignment. The increased speed and weight of the traffic passing over the roads also demanded a more stable and perfect roadbed and ballast than the natural soil, which was first used.

When there is an available supply of clean gravel of the right size, this want is fully met at the lowest cost; but the territory not so well favored is comparatively large. Broken stone is a favorite ballast on some of the Eastern lines, and in many places in the West where a gravel supply cannot be readily obtained. When neither good gravel nor broken stone can be procured, except at a high cost for transportation, we see burned clay ballast coming into more or less favor. The process consists in burning clay in long piles, by means, usually, of the refuse "slack" from the coal mines. It is necessary, of course, that the clay be of a quality that will bake hard, break easily into pieces available for ballast, and that the weather shall have no effect upon it when in the track. The material most available for this purpose is a black, loamy clay, sometimes called "gumbo," which is usually found in the valleys of streams. The ballast made from this material furnishes a secure, easily drained roadbed free from dust, and the fragments show but little wear from the weather.

This material has been used to a greater or less extent with good success, not only abroad, but upon a number of Western roads, among which are the Rock Island, the Chicago, Burlington & Quincy and the Hannibal & St. Joe, while the Burlington, Cedar Rapids & Minnesota is reported as experimenting with a view to its use. The cost of the burned ballast upon cars at the place of manufacture is from 50 to 60 cents per cubic yard, the price varying somewhat with cost of the fuel used. At this figure, however, it would seem as if it were worthy of a more extended use upon prairie lines. H.

Smoke Stacks and Other Matters.

TO THE EDITOR OF THE RAILROAD GAZETTE:

You have asked my opinion as to the several cast iron smoke stacks recently illustrated by you [See *Railroad Gazette*, April 18].

One thing is quite certain, if a man expects by information received from the various master mechanics he meets on his travels, to decide what is the proper practice as regards stacks, exhaust pipes, etc., he is very much mistaken. He is more likely to be stricken with a severe attack of brain fever as the result of his endeavours to account for one device "working like a charm, and saving heaps of coal," on one road, and for its contributing to the scrap heap on another. The only satisfactory plan to find out what gives the best results, is to make systematic experiments for one's self, keeping careful record of the conditions upon which each test is made.

A combination of a certain stack with a certain exhaust pipe and nozzle, and bearing the same relative positions, may, with a grate of one pattern, give the best possible results; while with another form of grate, varying somewhat in the area of its air spaces, partial failure will ensue. Then again, with the same stack, exhaust pipe, nozzle, and grates, one fireman can make an engine steam freely with an economical consumption of fuel, while another man, by a different mode of firing, is always short of steam, resulting in waste of both fuel and water. Experiments to be worth anything, will take a good deal of time and personal attention, or most inexplicable and contradictory results will be obtained.

Statements have been made that heretofore we have been using stacks of too large diameter, but with those larger diameter stacks we used low nozzles, and the steam filled those stacks just as well as the steam from high nozzles now fills stacks of smaller diameter.

If a man tries to combine a low nozzle with a stack of comparatively small diameter, he will find he is driven to use a lifting or petticoat pipe to resist the spreading of the exhaust steam, and to prevent its striking the smoke box and thus seriously baffling the free discharge into the stack.

Men using this combination speak highly of it, and probably the extra duty of induced current, caused by the greater distance travelled by the steam in the smoke-box, may counterbalance the friction of the sides of the lifting pipe, and reduction in speed of the steam while traversing the length of the stack, but where this combination is in use it is believed that no comparative tests were made with high nozzles and smaller stacks. A low nozzle, in combination with a short petticoat pipe, and comparatively large diameter of tapered stack, may with the same sized nozzle be expected to give a softer and more continuous exhaust than that produced by a high nozzle and small stack; but a grate that would suit the one, might be found deficient in air space for the other.

It would then appear that before we can expect to arrive at anything like perfection in smoke stacks, exhaust pipes and grates for any particular kind of fuel, all possible combinations should be tried, entailing more time and study than most master mechanics can afford the subject, but, nevertheless, well worthy of it. It may be asked have those roads which have adopted one size of stack for all sizes of engines found by careful experiment that no benefit is to be derived by deviating from the rule? If such experiments have been made, their publication *in extenso* is anxiously looked for, and will doubtless save many master mechanics the trouble and expense of going over the same ground. More men are inclined to doubt the expediency of this practice, than to fall in line with it, and we all hope that the Master Mechanics' committee on this subject will fully ventilate it. We want to know what design of stack will give us the best steaming engine with the largest exhaust nozzle, and also the proper position of the latter. There is a great disparity in the dimensions and designs of stacks used by the Pennsylvania, the Richmond & Danville, the Wabash, the Wisconsin Central and other roads, and all are reported as doing well. The committee has, doubtless, well studied the subject, and the report is anxiously looked for by every member of the Association. CHARLES BLACKWELL.

The Engine Brake as an Alternative when the Train Brake Fails.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The editorial columns of a late issue of the *Railroad Gazette* contain articles upon recent air-brake failures and the Senate bills on safety appliances. The air-brake failures, having resulted in killing three and injuring fourteen passengers, lend additional interest to the consideration of safety appliances, and I wish to suggest a remedy that would largely mitigate, if not entirely prevent, such accidents in future. The circumstances of those three accidents, and of the last bad accident on the Lake Shore, indicate that in each case some one did not do something to make the brakes operative, or did something to make them inoperative, or that there was actually some defect in the air-brake equipment itself. They furnish some suggestive facts forming a basis for inquiry for those who are introducing legislation upon safety appliances, and it may be asked if a brake that offers as many opportunities for interference, and whose utility depends upon so many points of adjustment, is such an excellent safety appliance that it deserves to be legislated into general adoption upon the freight cars of the United States? If it proves itself so liable to derangement upon passenger cars, where it has a trained staff to take care of it, what is to be expected from its use upon freight trains, where the difficulties increase in proportion to the greater number of cars equipped, all requiring the same skilled attention?

In the article upon the Senate bills on safety appliances, there occurs this sentence: "No one denies that the air-brake has now been perfectly adapted for freight service." In view of the accidents above recited, are we not justified in asking if this is really the case? The air-brake has been made a financial success, and some railroads are determined to use it for freight service, and may eventually compel the others to do likewise; but that does not prove the air brake to be the *ne plus ultra* of brake engineering, and it would be very unwise for Congress to block the road to improvement by legislation; the Cullom bill is sufficient evidence that opinion is by no means unanimous upon the freight train brake question.

It is conceded that the demand for legislation was formulated by ex-Commissioner Coffin from purely philanthropic motives. His demand is for devices that will not expose the train hands to danger in handling their trains. Does the air brake accomplish this? Do not the train hands have to go between the cars to make the coupling to the air brake? Is there no element of danger in this, especially at sidings, where cars are so often "taken on" and "left off?" I have before pointed out that so far as the safety of the train hands is concerned, an efficient engine brake meets the requirements. I know there is a disposition to pooh-pooh the engine brake, but the truth will come to the surface. Even now freight trains are being controlled by engine brakes alone, and no brakemen are called to the tops of the cars to apply brakes, every stop being made by the engine brake. This meets the ex-commissioner's demand and emphasizes the fact that trains can be controlled by the engine brake. And why not? Take the standard of control of trains, as given in the example selected for illustration in the article under consideration. I refer to the 25,000-lb. coal cars loaded with 60,000 lbs. of coal, on 200-ft. grades, which are said to be efficiently controlled by 24 per cent. of the weight braked. Now the weight of an ordinary passenger engine and tender is 130,000 lbs., and the weight of an ordinary passenger train, consisting of a baggage car and four coaches, is 260,000 lbs.; therefore the engine and tender is 33 per cent. of the weight of the train. Suppose the engine and tender to be equipped with an 80 per cent. independent steam brake, and we have 26 per cent. of the weight of the whole train braked, which is two per cent. more than is said to be necessary for successful control of heavy coal trains on a 200-ft. grade.

To further illustrate the importance of the engine brake, push the calculation a little further, and it is shown that such an engine brake will stop the train from a speed of 35 miles per hour in 838 ft. Here, then, is a valuable auxiliary that can always be relied upon to do its work when the train brake fails. I say it must be an independent or steam brake, because it is obvious that if the power on the train be air or vacuum, and it is coupled up with them, if they fail all is gone; *while steam is always on the engine when a brake is needed*, and the failure of the train brake does not then affect the engine brake, which is sure to stop the train. To couple up the engine brake with air or vacuum is criminal, and ought to be so regarded. There is no difficulty in working the engine brake in unison with the train brake, even if one be steam and the other air; they can be operated simultaneously by one and the same handle; but it should be insisted upon and so incorporated in the bill that it be an *independent power brake*.

To apply the result of this reasoning to the accidents that provoked the article eferred to: Would the engineer on the Southern Pacific have "lost his head" if he had known that, the air failing him, he still had upon his engine a steam brake that could stop his train? Or when the flying débris struck the air cock and rendered the air brake useless on the Chesapeake & Ohio, would we ever have heard of the loss of life if the engineer could have fallen back upon his steam brake? In the third case, also, it is more than possible that no fatal results would have followed the failure of the air to hold the train had the engine been properly equipped with an efficient steam brake. JAS. HOWARD.

Exhibition of the Van Dorston Coupler.

The Van Dorston Cushioned Car Coupling Equipment Company gave an interesting exhibition of its coupler on some freight cars of the Philadelphia & Reading, in the yards of that road at Wayne Junction, Philadelphia, on May 16. A large company of railroad men and others was present. As most of our readers know, this coupler is of the M. C. B. type, with rubber cushions inserted at two points to break the shocks in coupling. It was fully described and illustrated in the *Railroad Gazette* of Dec. 14, 1888.

The exhibition was, of course, merely to show the facility with which the coupler can be operated, and the good workmanship which characterizes its construction, the general merits of automatic vertical plane couplers, and questions of cost, durability, etc., not being susceptible of consideration in such a brief test. There were eight new cars, and a yard crew coupled and uncoupled these on straight and curved tracks a number of times. The saving in time over ordinary hand coupling with links was effectively illustrated when the eight cars were uncoupled, a space of about 15 or 20 ft. left between each two cars, and the whole subsequently pushed together by the engine. The whole eight couplings were made in about 10 seconds (or less), as against from one to three minutes, which would be required to make that number of couplings by hand. The efficiency of an automatic coupler not only as a safety device, and as a more economical apparatus than the old, but as an economizer of time as well, must be by this time very apparent to all train and yard men who have investigated the question, and the possible saving in losses from breakage of goods in cars as well as of parts of cars themselves should be a no less important item. When a train of 30 or 40 cars has to be switched upon three or four tracks, in drafts of two or three cars each, and the time available is short, much of the damage from wear and tear is caused directly by the undue haste with which the men perform all their operations. The first draft dropped down

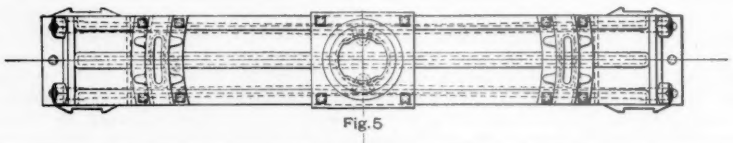


Fig.5

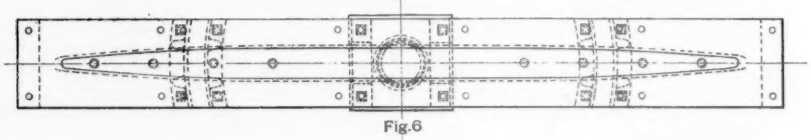


Fig.6

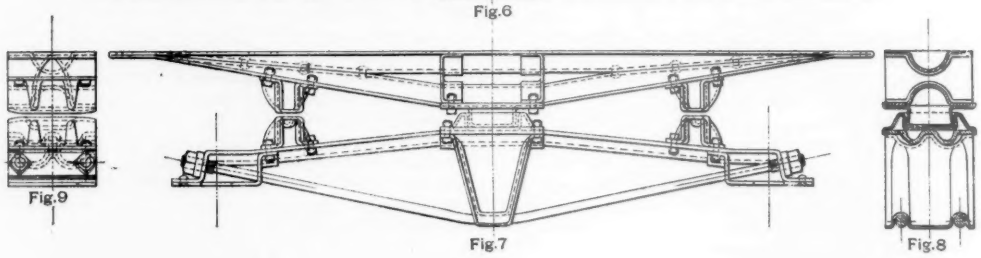


Fig.9 Fig.7 Fig.8

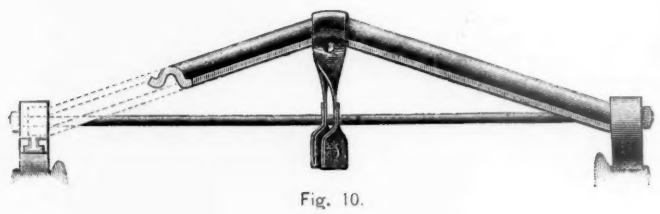


Fig. 10.

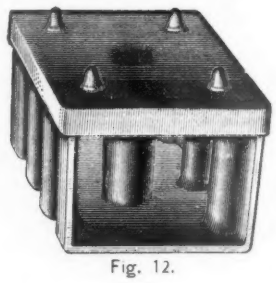


Fig. 12.

DETAILS OF THE SCHOEN PRESSED STEEL CAR.

(For further illustrations see Inset.)

upon the caboose is allowed to bump much harder than it ought, because the brakeman is anxious to get back in time to catch the third or fourth draft; and this same cause operates throughout the whole job. As every one knows, draft rigging and frames have had to be made stronger year by year, largely to meet the demands of just this kind of service. With an automatic coupler, and men who will exercise any reasonable degree of care, these conditions may be materially changed. With an automatic coupler, if a brakeman thinks he has not time to ride a car completely back to the one which it is to be coupled to, he can stop it at almost any intermediate point and then, pursuing this plan with the whole train, the engine, after getting the last draft, can couple the whole train in a very short time.

As we are still in the darkness of the "transition period," many trainmen will, no doubt, be inclined to look upon this as a mere speculation or fancy sketch; but at the rate companies are now ordering standard couplers the transition period may come to an end before the present generation of brakemen is all killed or maimed. Most of the honest opinions of train and yard men that have been published on the subject of automatic versus link couplers have been in favor of the latter; and this is natural, because the men in each case—almost necessarily—looked chiefly at the dangers of the transition period. But a very little experience with vertical plane couplers ought to greatly broaden their views.

The cars on which the coupler was exhibited are part of a lot of 1,000 plain gondolas and 3,000 twin hopper gondolas now being delivered to the Philadelphia & Reading from the works of the Pullman Company, Pullman, Ill. These cars are of 50,000 lbs. capacity, and weigh about 25,500 lbs. They are of unusually neat appearance, the workmanship being excellent at all points. They are 37 ft. 2 in. long over the end sills and 7 ft. 7 in. wide. They are 34 ft. long in the clear, so that they will readily take two lengths of 16-ft. boards or plank. There are auxiliary stake irons on the side boards, near the upper edge, to permit the use of high stakes when carrying loads of lumber which reach above the side boards. The sides of the hopper cars are 36 in. high and of the plain gondolas 30 in. The dead blocks on these cars are 6 in. × 9½ in. × 18 in., placed vertically one each side of the coupler. The body bolsters are made of two 5-in. channel irons weighing 14 lbs. per foot, stiffened with an oak timber 8½ in. × 13 in., all bolted together with four ¾-in. bolts and trussed with four 1¼ in. round iron rods. The trucks are of the diamond pattern, wheel-base 5 ft.; chilled wheels 33 in. in diameter.

The Schoen Pressed Steel Car.

(WITH AN INSET.)

We show in the accompanying cuts and on the full page inset an elegant design for a gondola car construted almost entirely of steel. Some of the details are special pressed shapes; others are commercial shapes with which all are familiar.

The inventor has aimed to make no radical departure from the general plan which has been tested and proved by years of actual service; that is, while the car is built of steel, the design embodies essentially the best features in general use in car construction.

The truck as may be seen by the illustration is of the ordinary diamond pattern so universally used, substituting steel guide bar columns, steel channel, and a pressed steel, corrugated, trussed bolster. This is an especially interesting feature in the car, as it has great strength and is very light. The centre plates are of pressed steel, and made to interlock. This feature does away with the necessity for a king bolt, with all its attending annoyances. This is well shown in figs. 1, 2, 3 and 4. The depressed and depending portions are made slightly oblong in opposite directions and placed together and given a quarter turn, which interlocks them so that they cannot be separated. This is a very valuable feature. The body bolster is a modification in form of the iron bolster commonly used; the advantage being that it is pressed into a shape that gives much more strength from a given weight than is obtained by the old method. A clearer illustration of this is shown in figs. 5, 6, 7, 8 and 9, which illustrate the truck and body bolster with centre plates and side bearings. In this view the truck bolster is shown as somewhat modified from that shown in the inset by substituting a pressed steel king post and pressed steel spring seats at the ends, in place of castings, as shown in the original design.

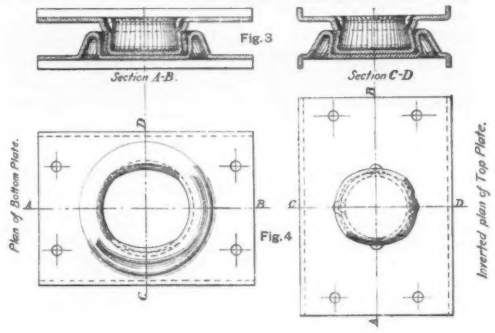
Fig 10. illustrates the pressed steel trussed brake beam, the compression member of which is arched and corrugated so that a direct tensile strain is thrown upon the rod, thus giving an exceedingly stiff and light beam. The drawbar attachment is made of pressed steel and so shaped that the value of all the bolts is obtained either in pulling or in buffing. This is illustrated separately and more clearly by fig 11. As this is a part of the car which is most liable to damage, and should be easy to repair, the ordinary oak draft timbers are used in connection with the steel drawbar attachment.

The end sill is of steel and trussed by rods running through from the outside sill to the two centre sills. The two centre sills are also connected together with cross rods at this point, and instead of iron bands, the corner irons are run across from sill to sill, and securely bolted, making a very strong end to the car. The sills consist of two channels and four I beams, braced across the car underneath, at intervals, with light channels.

The stakes are of pressed steel, hollow. The sides and ends are of steel, the sheets being of a width equal to the height of the body. The sheets are corrugated as shown in section, the lower edge having a flange turned inward, and bolted through the floor to the side sill, two bolts through each floor board, thus making the side of the car very stiff for sustaining load. The sides are riveted or bolted to the outside stakes as shown in elevation.

The truss rods are of steel, also the truss rod supports; and auxiliary pressed steel stake pockets are on the side of the car. The ordinary oak floor is used.

The dead blocks are of pressed steel, heavily ribbed in the sides, illustrated separately in fig. 12. The corners of the car are securely put together with inside and outside corner bands reaching from top to bottom, with transverse ribs.



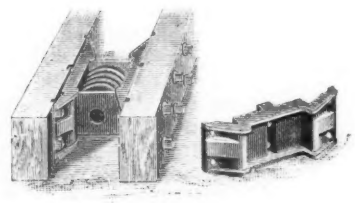


Fig. 11.

This steel car was designed by Mr. C. T. Schoen, President of the Schoen Mfg. Co., Philadelphia, and is the result of some two years' practical experimenting in the art of shaping steel plate into the forms best adapted for securing the greatest amount of strength by the use of the least amount of material, in car construction.

The importance of eliminating every pound of unnecessary weight is of much more account than would appear to a superficial observer. The weight of this steel car is about 18,000 lbs.; the weight of an ordinary 34-ft. gondola car of equal capacity (60,000 lbs.) is about 26,000 lbs., making a difference of 8,600 lbs. in weight. Assuming that the cost of moving dead weight is from one-fifth to one-fourth of a cent per ton per mile, and taking the minimum cost of one-fifth of a cent as a basis for calculation, and taking 8,000 miles as the average mileage per annum, and assuming the saving in dead weight to be four tons per car, we have a saving of $64 per car per annum. This is a rough figure, but it is close enough to suggest that a steel car of the weight named would be of advantage to railroad companies, providing the cost of the car or its maintenance in proper condition for service did not exceed that of the ordinary car.

In the designing of this car all these points have been constantly kept in view, and the aim has been not only to make a light car but to reduce the number of parts to the lowest point consistent with economy and strength in its construction; and as a result the design shows a car which would undoubtedly be less expensive in the item of repairs than a wooden car. Its strength and resilience are such that it may be expected to stand extraordinary shocks without injury. The steel from which it is constructed is sufficiently high in carbon to make it elastic and prevent deformation. It is assumed that the shocks due to concussion will be absorbed throughout the entire car to a much greater degree than in a wooden or iron car, and that being the case, the injury from concussion will be reduced to a minimum, and it follows logically that the cost for repairs is correspondingly decreased. In considering the value of this steel car it is necessary to clearly understand and distinguish it from a car built of iron.

In order that a steel car may be commercially successful, its cost must not greatly exceed that of the ordinary car, and with this in view, the aim has been to shape every part entering into its construction so as to get the maximum strength with the minimum quantity of material. The result is that it can be built for about the cost of a first class wooden car.

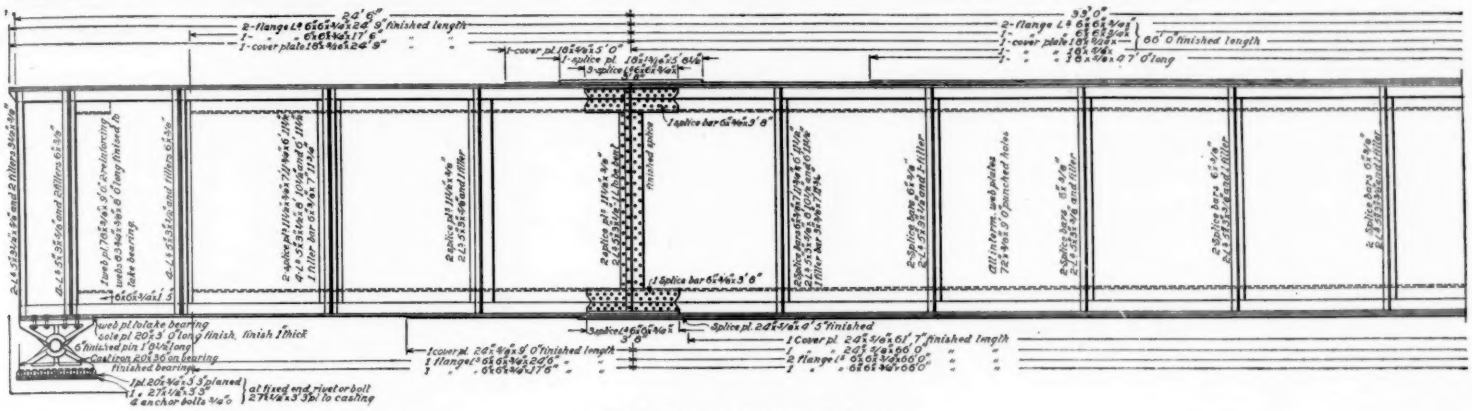
The company propose building a number of these cars as soon as their new plant in Pittsburgh is completed, and putting them in service for the purpose of developing by practical test any possible weak point.

Long Plate Girder Bridges and Their Economy.

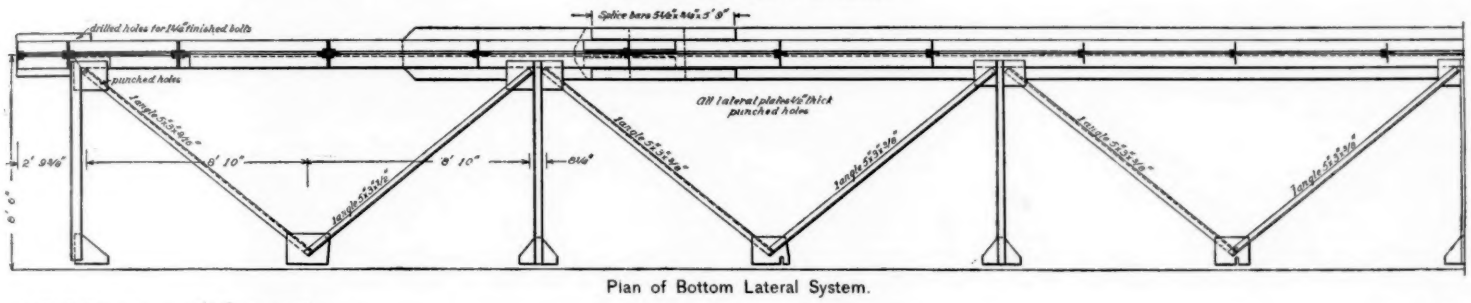
BY G. H. THOMSON, C. E.

Example: The example illustrated is a plate girder bridge 115 ft. long, for single track, branch lines of the New York Central & Hudson River Railroad. It was designed by Mr. Walter Katté, Chief Engineer, and Mr. G. H. Thomson, Bridge Engineer, and was built by the Elmira Bridge Co. The bridge weighed 80 tons, and cost about $7,000 erected. The web is of wrought iron and the flanges are of open-hearth steel, with all holes drilled. The bridge is coated with a solution of Trinidad asphalt, which adheres tenaciously to the metal, and neither hardens nor runs, and is very durable. The guard timbers are 8 in. × 10 in., notched down over the ties, and placed 9 ft. 4 in. apart in the clear. The ties are 9 in. × 12 in., spaced 1 ft. centre to centre.

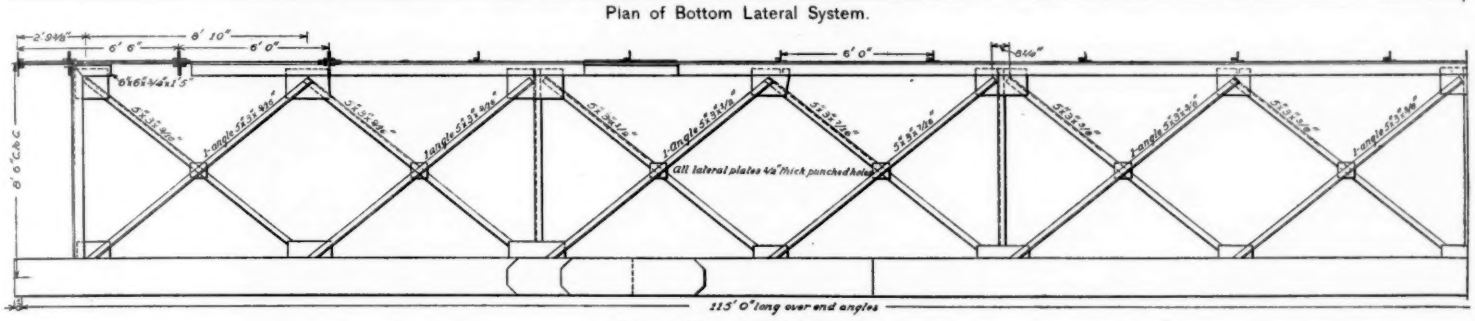
Erection: The erection of long plate-girder bridges is easy of accomplishment and inexpensive (especially where an old, deck, Howe bridge, with floor, is to be re-



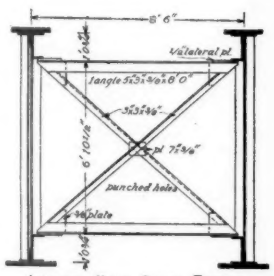
Side Elevation of One-Half of Girder.



Plan of Bottom Lateral System.



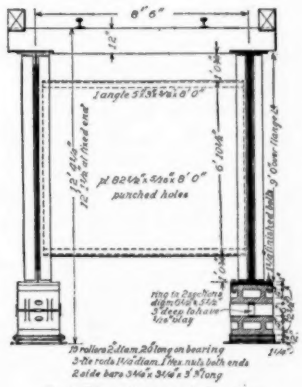
Plan of Top Lateral System.



Intermediate Cross Frame.

115-FT. PLATE GIRDER BRIDGE FOR SINGLE TRACK BRANCHES—NEW YORK CENTRAL & HUDSON RIVER R. R.

WALTER KATTE, CHIEF ENGINEER. G. H. THOMSON, BRIDGE ENGINEER.



End Elevation and Section.

placed), and much in favor with railroad superintendents and those interested in maintaining traffic, as six hours' detention of trains is all that is necessary. The girders are generally delivered in one piece for 95 ft. length of span; over that length in three pieces. The pieces are joined together on the cars within five miles of the bridge site. Then the cars (six in all) with the girders are hauled up to and over the bridge. The girders are then raised up sufficiently to allow the cars to be withdrawn, after which the rails and timber floor of the old bridge are taken out and the girders lowered to place. The tools required are few—some tackle, crabs, etc., such as are in use on all railroads and in bridge shops, and some timber for two temporary frames or derricks.

Maintenance: The expense of maintenance of long plate bridges is practically nothing for superstructure, except recoating with asphalt once in 18 to 25 years, at a cost of $1 per ton for 2 coats.

The expense of maintenance of substructure, for long plate girders, is favorably low when compared with cost of maintenance of substructure supporting short span plate girders, for the reason that long plate girders do not shake the substructure, and are, therefore, not so destructive to it. If the masonry is of poor stone, and badly bonded, the girders can be placed on pivoted bearings, as in the case illustrated.

Economy: Certain situations and conditions favor long plate girder bridges (single track and under grade) up to 125 ft. span, for economical reasons.

Recent improvements in machinery, and the advance in shop equipment and practice, cheapen long plate girder work. All the rivets can now be power driven for girders 10 ft. 6 in. deep.

The condition being given of two good abutments, and one failing pier (or two spans of 60 ft. deck timber bridge to replace), it will be cheaper both immediately and remotely to put in a long plate girder than to put in two short ones, build a new pier, and raise the two bridge seats of two abutments. The short plates will sooner or later break up the substructure (especially on the pieced-out abutments) and pier masonry, to withstand the shock of short plates, must be of dimensioned stone and expensive. Also, questions of width of waterway and existing masonry can sometimes be settled economically by taking out a pier and putting in long plate girders, thus avoiding two new abutments.

The cost of a second-class lattice through bridge (single track) is about the same as the long, deck plate girder, and the desirability of placing all structures under grade being assumed, it will in many cases be found that long plates are economical. This obtains where the height is sufficient to allow the depth of girder to be one-twelfth, the span for heavy loading.

From the point of view of railroad men, a bridge of the deck plate type is the most serviceable and reliable of all the types of metallic bridges, and in a long plate bridge the cost of maintenance of substructure (which last item is a growing one on railroads with heavy traffic) is reduced to a minimum, while a well-designed long plate girder will never need repairs or adjustment.

Cincinnati Meeting of the American Society of Mechanical Engineers.

The twenty-first meeting of the American Society of Mechanical Engineers, held at Cincinnati last week was opened on Tuesday evening, May 13, at 8 o'clock. Mr. Geo. A. Gray, of the local committee called the meeting to order and introduced President M. E. Ingalls, of the C. C. C. & St. L. R. R., who addressed the society, extending a hearty welcome to Cincinnati. Prof. Eddy, of the University of Cincinnati, also addressed the meeting, and President Oberlin Smith responded in behalf of the society.

Actual business for the evening was introduced by the presentation of Prof. J. E. Denton's paper on

THE MEASUREMENT OF DURABILITY OF LUBRICANTS,

of which, in the absence of the author and of Secretary Hutton, Mr. C. J. H. Woodbury gave an abstract. The paper was a good one and gives several new points, with reference to the physical tests of oils. The following are extracts:

Practical differences of durability of lubricants depend not on any differences of inherent ability to resist being "worn out" by rubbing, but upon the rate at which they flow through and away from the bearing surfaces. The conditions which control this flow are so delicate in their influence that all attempts thus far made to measure durability of lubricants may be said to have failed to make distinctions of lubricating value having any practical significance.

The primary idea of determining durability is, naturally, to supply a measured quantity of lubricant to certain rubbing surfaces and determine how great an amount of rubbing the lubricant will withstand before its power of maintaining the friction, at some agreed-upon minimum, is exhausted.

Upon analyzing the black paste to which a lubricant reduced itself, Dr. Dudley found that it was composed mainly of the material of the bearings themselves, showing thereby that the limit to the friction producing qualities of a lubricant tested in this manner was the rate at which it adulterated itself with the metal worn off the bearings, notwithstanding that the amount of the latter was so infinitesimal that years of operation of the machine would not detect the wear by any finite measurement of the dimensions of the bearings. The rate of this metallic wear being infinitely variable, it is evident that the durability of oil cannot be measured by restricting our measurement to the behavior of a fixed quantity whose amount shall be so small as to allow of no surplus oil about the bearings; or, in other words, maintain all of the oil under rubbing action at once. The failure of the method is attributable also to the fact that so little oil was employed compared to the amount of rubbing surface that the latter could not remain uniformly covered. It is natural, therefore, to inquire whether the method would not be more successful if a greater amount of oil could be used permitting a slight surplus, but applied upon some plan which would enable the surplus to be employed to secure regularity in the distribution of the oil over the rubbing surfaces. Such a plan has been tried by the writer on a larger size of Thurston testing machine having a journal about four inches diameter and seven inches long, with brasses of the same proportions as used in railroad car service, except that the arc of contact was reduced so that the total bearing area of two brasses was about 17 sq. in. The journal was of wrought-iron reduced to such a condition that with standard lard oil under 350 lbs. per sq. in. pressure, and about 250 revolutions per minute, a co-efficient of friction of four-tenths of one per cent. could be maintained.

It was evident that irregularity of conditions existed of a nature beyond the reach of any available means of control, and so far as is known to the writer there is no method of employing so little oil on a journal as to prevent its escape from the latter and determining anything representative of the quality of durability. The clever device adopted in the Pennsylvania laboratory, at Altoona, of saturating a strip of felt laid in a cavity in the lower brass with the oil to be tested, is another method of making a fixed quantity of oil be wholly devoted to the lubrication of the bearing surfaces, the slight tendency of the oil to escape being checked by sucking up the waste oil with a pipette and continuously restoring it to the journal. No attempt is made, however, to determine any quality of the lubricants tested other than their co-efficient of friction.

The rates at which oils are supplied to practical bearings are, however, greatly in excess of the amount applied in the above tests. A very economical case of practical oil consumption is when a locomotive main crank-pin consumes about six cubic inches of oil in a thousand miles of service. This is equivalent to a consumption of one milligram to 70 square inches of surface rubbed over, or ten times as great an amount as that used on the testing machine. If, therefore, the latter amount provided a surplus requiring special provision to prevent escape of oil from the bearings, what must become of the surplus present on the locomotive crank-pin and other bearings using oil with the same economy, of which there are numerous examples in every class of machinery? Undoubtedly it must continuously escape from the journal. The 35 minims of oil, used in the test described, was so little contaminated by the absorption of metallic wear under 30,000 revolutions that the fluidity was not greatly reduced. Consequently, with ten times as great an amount of oil to absorb the metallic particles, the oil leaving the locomotive crank-pin is but little changed in fluidity, and flows from between the surfaces with practically the same freedom as when in a fresh condition. It follows, therefore, that the economy of one oil over another, so far as the quantity used is concerned—that is, so far as durability is concerned—is simply proportional to the rate at which it can insinuate itself into and flow out of minute orifices or cracks. Oils will differ in their ability to do this, first, in proportion to their viscosity, and, second, in proportion to the capillary properties which they may possess by virtue of the particular ingredients used in their composition. Where the thickness of film between rubbing surfaces must be so great that large amounts of oil pass through bearings in a given time, and the surroundings are such as to permit oil to be fed at high temperatures or applied by a method not requiring a perfect fluidity, it is probable that the least amount of oil will be used when the viscosity is as great as in the petroleum cylinder stocks. This was pointed out by the writer in a former paper presented to the society in connection with a description of various viscosimeters. When, however, the oil must flow freely at ordinary temperatures and the feed of oil is restricted, as in the case of crank-pin bearings, it is not practicable to feed such heavy oils in a satisfactory manner. Oils of less viscosity or of a fluidity approximating to lard oil must then be used, and the differences among such oils, with respect to the quality of entering and leaving the spaces between the bearing surfaces, may readily be imagined to depend in a considerable degree upon differences of capillary property arising from choice of ingredients forming any particular mixture. We are led, therefore, to conclude that a test of durability must be a test of the rate at which two oils fed to the same journal, by the same device, and under the same circumstances, permit themselves to flow between the bearing surfaces and out of, and off of, the bearings, and that oil may differ in this respect with every variation of ingredient and viscosity. As necessarily there will be surplus oil which will escape from the reservoir and do no lubricating service before being led off of the bearings, it follows that every particular condition of bearings will affect the amount of oil consumed, and hence our oil-testing machine, to determine durability, must be the very machine upon which the oil is, used or a copy of the same.

It seems hardly possible that the quality of durability in lubricants can be measured, except by copying in a very perfect manner the exact conditions of arrangement, proportion and method of feeding which are to be used where the lubricant is to be applied; and even when this precaution is taken, the fact that in some kinds of service the limit to the consumption of oil depends upon the extent to which dust or other refuse becomes mixed with it, as in railroad car lubrication and in the case of agricultural machinery, makes it almost hopeless to expect that laboratory tests can contribute very much of practical value in the determination of relative durability of lubricants.

That machines may be devised for the laboratory, however, and are, in fact, in use to-day in some of the latter, which will contribute much valuable knowledge to many questions of lubrications, through measurements of friction and metallic wear, is not to be denied, but the discussion of this part of the subject is not intended to be included in the scope of this paper.

The discussion of the paper was opened by T. R. ALMOND, who gave his experience with a machine having 11 bearings of steel and cast iron, working at a speed of 140 revolutions per minute, and transmitting from four to five horse power. The machine was fed with 1¼ pints of what is known as "Vacuum Electric" machine oil, and after 12 months running one pint of oil was taken out, showing that one-half pint had been consumed. Fresh oil was then introduced, and, on again starting up, the machine was found to heat, though it subsequently cooled down to the temperature under which the old oil had been running. Perfect circulation of the oil was secured in the machine and the results seemed to show that the oil improved rather than deteriorated with use.

Mr. PORTERFIELD had found an inferior oil to give cooler running, owing, he thought, to the fact that, being less viscous, it more readily carried off dust accumulations.

Regarding the practically flooded bearings of the Westinghouse engines a member stated that the engines were supplied regularly, by a sight feed arrangement, with a special oil. This, by the working of the engines, was thoroughly mixed with the water in the crank chambers, and when overflowing, due to accumulation of water of condensation, was sometimes caught and used over again. The oil so gathered was found practically unchanged in quality.

Mr. C. S. DUTTON followed with a paper entitled

SOME EXPERIENCES WITH CRANE CHAINS.

He said the ability to stand bending cold is the most important quality of chain material, because that is the principal, if not the only, cause of chain failure. In fact, for this purpose the cold bend test will usually show all the engineer wants to know of the material. And as long as we are willing to believe that a brittle link was made so by some mysterious influence or condition of its use, so long will chains be made of cheap cold-short iron.

A written discussion was presented by Mr. G. C. Henning, who attributed the failures mentioned to high phosphorus percentage in the iron and careless workmanship. He emphatically recommended low phosphorus and sulphur, and as regards tests stated that the customary proof tests were of no value and should be supplanted by tests closely approximating in character to the treatment which the chains experienced in the course of actual work. Electric welding was recommended by him for chain links.

The concluding paper of the session was "Memoranda on Indicating the Engines of the S. S. 'City of Richmond,'" of the Inman & International Steamship Co. This paper elicited no discussion.

After the announcement of several invitations which had been received to visit works in Cincinnati and vicinity, among them the Addystone Pipe Works and the Cincinnati Gas Light & Coke Co.'s work, the meeting was adjourned until Wednesday morning.

WEDNESDAY, MAY 14.

At the Wednesday morning session routine business was first in order. There are now 16 honorary members, 9 life members, 956 full members, 48 associates, and 104 juniors—total, 1133.

A report was read concerning the proposed memorial to the late Capt. Ericsson, Congress being petitioned to recognize his services and show the appreciation by the nation of his inventions and discoveries.

Following this were the reports of the Committees on "A Standard Method of Conducting Duty Trials of Pumping Engines," and on "Uniform Methods of Tests of Materials." With regard to the latter a general written discussion was invited. A report was submitted also by the Committee on "Flange Diameters of Pump Valves and Pipes." The report, so far as it went, was accepted, and the Committee continued.

Mr. Forsyth, of the C., B. & Q. R. R., moved that a committee be appointed to formulate a method of standard tests for the efficiency of locomotives. Messrs. E. B. Wall, Wm. O. Webber, Geo. S. Strong and D. L. Barnes, in discussion, favored the appointment of such a committee, and the motion was carried. The committee subsequently appointed to take the matter in hand consists of Messrs. C. B. Richards, Wm. Forsyth, F. W. Dean, Allan Stirling, A. S. Vogt, H. B. Stone and J. E. Denton.

The first paper of the session on

THE EFFICIENCY OF LOCOMOTIVES,

by W. F. Dixon, was then presented by the secretary. A few extracts follow:

It is no exaggeration to say in 1890, as Mr. Clark did in 1852, that with a well-designed link motion of liberal proportions the objection of wire-drawing is of no practical weight. With regard to compression, there is no doubt that at times it does become excessive, considerably more than is necessary for the smooth running of the engine. Even if we did not have the evidence of the indicator as to this, substantial proof is afforded by the fact that the main crank-pins of high-speed locomotives are usually worn more on the sides than on the top and bottom, the pin being on the centre when calipered.

The clearance spaces in any cylinder bear such a close relationship to the compression curve that they must enter into all discussions of it. In engines like the locomotive, where a single valve controls all the events of the stroke, it is undesirable to reduce the clearance spaces to less than 7 or 8 per cent. of the piston displacement, for at short points of cut-off the compression line would run up so abruptly as to reach initial pressure before the piston had reached the end of the stroke. From one point of view, the steam of compression should reach a pressure just sufficient to arrest the motion of the piston, crosshead, etc. Any increase above this detracts unnecessarily from the area of the indicator card, but does not diminish the efficiency of the engine. On the other hand, if compression is carried to initial pressure, none of the incoming steam is required to fill the clearance spaces and to raise the cylinder walls to a temperature as high as its own. This is indubitably the reason why the locomotive engine at high speeds and short cut-offs is as economical a machine as it is. The reduction of indicator card area caused by early exhaust closure, and the large clearance spaces found in locomotive cylinders, is often overestimated. A certain engine, with a 24-in. stroke and worked with 160 lbs. boiler pressure, has clearance spaces equal to 10 per cent. of the piston displacement. When cutting off at six inches it has been found necessary, to insure smooth running, to compress to 54 lbs. To do this, the exhaust must be closed at 15.28 inches on the return stroke. Suppose, now, it was possible to reduce the clearances to 2 per cent., steam being cut off at six inches as before. To compress to 54 lbs. the exhaust must close only after 22.25 inches of the return stroke have been traveled. Fig. 188 shows the theoretical indicator cards which the engine would give in each case, and it will be seen that the M. E. P., when the clearances were 10 per cent., is 94.6 lbs., sinking to 91.8 lbs., when the clearance was reduced to 2 per cent.

If compression takes place suddenly, as is the case in cylinders having very small clearances, the heat does not have time to become equalized between the steam and the cylinder walls, and the power required for compression will be in excess of that necessary were the action to take place more gradually.

From the forgoing the writer has been led to the conclusion that although the clearance spaces in locomotive cylinders are usually larger than desirable, there is a limit, pretty sharply defined, below which it is prejudicial to go in reducing them, provided the link motion is retained. In cases where excessive compression has been found to limit the power of high-speed locomotives, a little inside clearance to the valves has been of great benefit in reducing it. This remedy might be advantageously used far oftener than it is, and would materially lessen the force of the objections erroneously urged against the link motion. The influence of clearance spaces as affecting the nominal point of cut-off and the terminal pressure has been treated of so often that no mention need be made of it here.

To overcome the evils of cylinder condensation and re-evaporation (1), steam-jacketing (2), superheating and (3), compounding have been suggested and tried.

That steam-jacketing the cylinders of a locomotive, taken by itself and not in connection with compounding, would result in some little saving may be taken as certain, provided sufficient means of draining were used. The application of jackets to the cylinders of an ordinary locomotive by Mr. Borodin, of Kief, Russia, showed a mean economy of steam of about 13 per cent. This, however, is probably much greater than could be expected in regular day-in, day-out service, and it is still further probable that the expense of constructing and maintaing the jackets would more than neutralize the benefit derived.

Superheating the boiler steam, to the degree of increasing its pressure, before admitting it to the cylinders has been tried several times in locomotive practice and as often abandoned. The chief difficulties met with were: (a) The expense of providing and keeping up the superheating apparatus; (b) the difficulty of lubrication, owing to the vaporization of the lubricants at the high temperature; (c) the impossibility of preventing leakage at the stuffing boxes, all vegetable packings charring with the heat and becoming worthless. Nor is it likely that the metallic packings, now so largely used, would be able to overcome this last difficulty, for, with a possible exception or two, their prominent features are steel springs and white metal rings. The springs would gradually lose their temper and become useless, while the soft rings, fusible at temperatures of from 250 degrees to 400 degrees Fahr., would melt.

The economy shown by the compound locomotive is usually attributed to the lessening of cylinder condensation, due to reducing the range of temperature per cylinder. When engines with well-protected cylinders are running at high speeds, it is hard to understand how condensation can take place to any hurtful extent. The writer has examined a large number of cards taken from locomotives, at speeds ranging from 40 to 65 miles per hour, but has been unable to detect any trace of either condensation or re-evaporation. Supposing, though, that some small amount of steam, say 7 per cent., was condensed at each stroke, why expanding in two cylinders, one presenting twice the area of the other, should diminish it is almost beyond comprehension. At slow speeds, however, the benefit of compounding is beyond dispute, as witness the success of the system both in marine and stationary work; but the bulk of the compound locomotives so far built has been for express passenger traffic.

It may safely be stated that no locomotive built during the last 20 years has been deficient in adhesive weight after once getting its train well in motion, notwithstanding the slight and unreliable evidence adduced to the contrary. In other words, the mean effective pressure in the cylinders when running at all fast is quite insufficient to cause the tractive force to exceed the adhesion. A feature of any substantial change in locomotive design will then probably be a method of increasing the coefficient of adhesion at starting, for although many devices tending to this end have been experimented with, we still, in default of something better, have to rely on mere dead weight, a large proportion of which is useless at other times, to get the trains away from the stations.

In the discussion which followed Mr. W. E. HALL, among other points, referred to the importance of improved combustion in the locomotive, remarking that this deserved fully as much attention as the matter of steam distribution in the engine proper.

Mr. ANGUS SINCLAIR referred to the prevailing tendency to try to improve upon the indicator cards from locomotives and the poor performances which invariably resulted from such attempts. High compression, he stated, was absolutely necessary with high speeds, to pull the reciprocating parts away from the end of the stroke, and re-evaporation was hard to detect because of wire drawing.

Mr. WM. O. WEBBER stated that the locomotive represented the highest type of high-speed engine under the most unfavorable conditions, and under the circumstances it was wonderfully efficient. The evaporative power of the boiler ranged from 6½ to 9 lbs. of water per pound of coal, and the coal combustion in the furnace from 90 to 136 lbs. per square foot of grate.

Mr. STRONG maintained that the locomotive was not wasteful if not pushed beyond its capacity. At present from 1,000 to 1,500 H. P. are frequently required from a locomotive of only 600 H. P. capacity. When the combustion was pushed beyond 150 lbs. of coal per square foot of grate the efficiency became very low.

Mr. D. L. BARNES, referring to the regulation of locomotives by the reverse lever, remarked that it was fortunate that the reverse lever was not always used, particularly in the case of locomotives having a tendency to prime; in such cases the throttle should be used to reduce waste. Nine pounds of water per pound of coal he considered to be too high a rate of evaporation for the ordinary locomotive, most of the results showing such high evaporation being obtained from observations which did not include an inspection of the character of the steam produced, and the 27 lbs. of water per horse power stated by Mr. Strong was altogether too low. There was no information extant to show just how much water was actually used, and no definite information on the subject need be expected until some satisfactory form of calorimeter could be devised for use on locomotives. Regarding the comparative effect of mogul and eight-wheel locomotives on bridges, it was evident that the mogul locomotive was not more detrimental and did not cause more strain than the 8-wheel locomotive, for several reasons; one of which was the reduced vertical action of the counterbalances, and another that the distribution of the weight on drivers did not materially alter the strain on the top and bottom cords, particularly in the case of long bridges, and the statement in the paper was incorrect. Regarding the estimate of cylinder condensation from indicator cards, such a thing was simply impossible in the case of cards from locomotives at high speed. This was easily seen by inspection of such cards. It is found that even the point of cut-off is difficult to determine. There were several statements in the paper which seem incorrect. One of these statements was with reference to the disadvantage of decreased clearance. One of the good points in the paper was the statement that locomotives had sufficent adhesion at high speeds.

Mr. WRIGHT suggested, as a means of testing locomotives, an arrangement of friction wheels on which the locomotive could be mounted and run at any desired speed, the locomotive being suitably anchored. The paper was further briefly discussed by Messrs. Durfee and Wood.

The next paper presented was on

WORKING OF RAILROADS BY ELECTRICITY,

by Willis E. Hall, Altoona, Pa. Extracts follow:

The day is not far distant when we shall see the railroads, generally known as steam lines, run by electricity from a central station. This is not the first time such an assertion has been made; but I have not as yet seen any discussion of the subject which has more than insinuated the advantages which would result in the operation of railroad lines by such a concentration of power. From a lack of time no attempt is made to analyze the two methods in a mathematical way, but rather it is aimed to point out some of the many advantages which the use of electricity allows, and which will inevitably result in operating a long line.

With this object let us take a few of the changes which the substitution of centralized electricity would

inaugurate when used in place of the present system of locomotives. One very important gain would be the concentration of the power at one point, for a given length of line, into a few cylinders, instead of working it in a number of isolated engines where the insulation is poor and the chances for condensation the best. A number of central stations—located, say, at a distance of 30 to 40 miles apart—could be run by large, powerful engines, and the expansion of the steam worked at an economical point by better and more mechanical means of cut-off than can be obtained in the present type of locomotive construction. With locomotives the ratio of expansion at low speeds is correspondingly poor, nor can we expect to make an efficient engine of it, except in one working condition which is dependent upon the concurrence of so many variables that the engine is never worked in that ratio for any length of time. With stationary engines, however, the case is the reverse, as such are designed to work at a constant speed, and if properly proportioned would be utilized at the highest grade of expansion consistent with economy. This point would not vary much, as experience with hydraulic and electric plants would indicate. The fluctuations in the case of a railroad line would probably be even less, as the working is generally uniform throughout the 24 hours of the day. It would be a case of a properly loaded automatic cut-off engine against the equivalent of a similar engine vacillating between an over to an under load, and such range of the broadest nature. We must not lose sight of the fact that the question of keeping the line clear is properly held as of higher value in a closely worked system than is the consumption of coal which may result per the horse-power which the engine is to develop to reach its destination as scheduled. In furtherance of a reduction in coal consumption, the use of condensing—and possibly compounding—at a central station would raise this part of the working of the line to the highest grade of efficiency.

In experiments recently made it was found that an electric motor could climb a grade of over 50 per cent. which is far beyond the point of adhesion of locomotives; so that in this direction we could look for a marked improvement.

The question of attainable speed enters as a factor, for the speed to which an engine can safely be driven is known to have its limits—and which, to all appearances, we are now closely approaching. The piston-speed of of an engine with 24 ins. stroke and 68 ins. diameter of driving-wheels, travelling at 60 miles per hour, would be about 1,400 ft. per minute. An increase in the diameter of driving-wheels, with the object of decreasing the number of strokes, makes the engine correspondingly weaker, so that two sharp horns of a dilemma are placed before him who attempts to design an engine to haul the increasing weight of trains at a high speed.

With electric motors it would not be necessary to have track tanks and water stand-pipes. Nor would it be necessary to carry the dead weight of tender. In this connection it might be well to mention the annoyances from cleaning fires, as is required in freight service where the division is a long one.

The experience with the centralization of power where large hydraulic, electric or pneumatic plants are in operation, is that a greater amount can be supplied than it is necessary to develop at the station—that is, where there is much division a 50 to 60 H. P. plant can take and supply satisfactorily about 100 H. P. In railroad work such a ratio could hardly be looked for, as the number of trains would not be as large as the division where the power is distributed for mercantile and commercial purposes; but a reduction of some 25 per cent. can safely be counted upon.

Multiplication of parts increases the number of pieces to wear and consequent repairs, as well as the chances of failure from breakage. No argument is necessary to indicate the advantage which electric motors would have over the present design, or over any other design of locomotive where all the requisites of an engine must be incorporated in so many isolated places. The reduction in the internal friction of the driving mechanism is also apparent.

President OBERLIN SMITH, in discussing the paper, spoke of the superfluity of the locomotive or special motor, and favored the attachment of motors to the axles of each car. Useless dead weight was thus avoided.

Mr. F. A. SCHEFFLER, of the Westinghouse Electric Company, presented a long written discussion in which he undertook to show that, considering the cost of an electric outfit for a railroad, electric traction could in no way compete with the steam locomotive, and that electric street railroads owed their existence solely to city ordinances which prohibited the use of steam locomotives in city streets. The statements of Mr. Scheffler were severely criticized by the members present, and his errors were brought prominently into notice.

Mr. H. C. SPAULDING did not think present conditions favorable to the use of electric traction on extensive lines. He suggested the use of high potential currents and low potential motors with induced electric currents, and referred to the importance of the absence of reciprocating parts in the electric motor. He spoke, also, of the possibility of utilizing water power for generating electricity for electric traction, and mentioned a 200-mile electric road in Georgia which is shortly to be operated in this way.

Mr. MCFARREN spoke of the effect of the ground circuit in electric roads in increasing adhesion, considering the claimed increase of adhesion very doubtful. He had made some experiments which proved that no increased adhesion was obtained by a passage of current through the point of contact between the rail and the tire.

Mr. BARNES stated that no reliable estimates of cost of electric traction could be obtained, though frequently asked for with the view of introducing electric traction.

Mr. FORSYTH stated that he had found the cost of a 7-H. P. electric motor, as given by electric companies, to vary from $400 to $1,100. He thought that electric motors would find their first extensive application to traction in switching. But unless electric companies charge less for their motors the railroad companies would be compelled to build their own before they would generally adopt them. The price was out of proportion to the work required to build the machine.

Prof. R. C. CARPENTER presented a paper on "Comparative Tests of a Hot Water and a Steam Heating Plant."

After a discussion by Messrs. C. E. Emery, Nason, Gobeille and Robb, another paper by Prof. Carpenter, entitled "Note on Kerosene in a Steam Boiler," was taken up. In the resulting discussion Mr. Nason stated that he had used crude petroleum in a boiler having a deposit from ⅛ to ¾ in. thick. The boiler was clean within six weeks after the first application of the oil, the scale coming off in large cakes.

Three papers on governors were then presented, the first being by E. J. Armstrong on "A Use for Inertia in Shaft Governors"; the second, by J. M. Smith, on "A Governor for Steam Engines," and the third, by John E. Sweet, on "The Effect of an Unbalanced Eccentric in Shaft-Governed Engines." All three papers were discussed together, the discussion being devoted largely to friction in governors. Mr. W. W. Bird followed with a paper on "An Open-End Mercury Column for High Pressures." The paper was briefly discussed by Mr. D. S. Jacobus, who presented a blackboard sketch of another gauge recently devised for similar use in the test department of Stevens Institute. The last paper of this session was on "An Automatic Absorption Dynamometer," by Mr. G. I. Alden. There being no discussion of this paper the following topical question was presented:

"Does a boiler steam move freely if the tubes are arranged so as to be further apart, horizontally, in the upper rows than in the lower rows?" Referring to this question Mr. SWEENEY presented a diagram of a horizontal, tubular boiler in which the tubes were arranged on lines radiating from a point about 12 in. below the bottom of the boiler. A boiler, built on this plan, showed very little fluctuation in the water line. No duly test, however, had yet been made of it. Mr. COLE suggested making the lower tubes of larger diameters than the upper ones. This, he thought, would answer the same purpose as Mr. Sweeney's design, which was to insure easy steam liberation.

Mr. SUPLEE stated that two boilers, so constructed, were in use in Philadelphia, with good results, the passage of the gases of combustion through the lower tubes, also being facilitated.

The evening session was opened by Prof. Webb's paper on "Peclet's Treatment of Chimney Draft." There being no discussion, a second paper, by Prof. Webb on "The Mechanical Theory of Chimney Draft," was taken up. This was followed by a paper on "Chimney Draft," by Prof. De Volson Wood, and another on "Recent Formulæ for Chimneys," by Mr. William Kent. These papers were discussed at length by a number of members, the discussion being chiefly of a mathematical character.

A paper by Professor Wood on "Graphic Representation of Thermo-dynamic Quantities," was then presented, but was not discussed. The three following papers were then presented, there being little or no discussion: "Test of a Refrigerating Plant," by Prof. Wood; "Hirn and Dwelshauver's Theory of the Real Steam Engine," by Prof. Thurston, and "A Universal Steam Calorimeter," by Mr. Barrus. A motion was made thanking Mr. Barrus for bringing to the attention of the society his calorimeter in its new form, and expressing their thanks for his services to the mechanical engineering profession in perfecting such a useful device.

The following topical question was then taken up: "What is the best form of hydraulic valves for water at high pressures?"

Mr. G. C. HENNING described the Emery valve, as used in the Emery testing machines, which showed no leak under 4,500 lbs. pressure per square inch. The valve seat is of hammered bronze, and the valve itself is a steel plug, carefully turned and ground. Both valve and seat are conical. The valve has been used with good results up to 10,000 lbs. pressure. A leather ring is used for packing.

Mr. A. H. RAYNAL stated that he had used Prof. Thurston's alloy for hydraulic valves with satisfactory results.

Mr. HIBBARD referred to the Critchlow valves, used in steel works practice.

A brief discussion of a question regarding experience with power molding machines closed the session.

THURSDAY, MAY 15.

Thursday was given up wholly to an excursion to the Niles Tool Works, at Hamilton, Ohio, and to the soap works of Proctor & Gamble, at Ivorydale, an elaborate lunch being served at Woodsdale Park by the Niles Tool Works, during which several speeches were made.

THE NILES TOOL WORKS.

At these works the mechanical engineers were much interested in investigating the shop methods and tools in use. These works have been developing rapidly of late, and at the present time the tools are nearly all new and of recent design. All the gears used in their machinery are cut, and where the bearings are not large and ample they are bushed with phosphor bronze. In the shops are building a number of large tools for the Midvale Steel Works, among which is a slotter of 50 in. stroke, which will cut in steel a chip 3 in. wide and ⅛ of an inch thick. Also a planer 10 × 10 × 20 ft. made for the special purposes of cutting large ingots of steel. The fastest speed is 16 ft. per minute. It is arranged with back gears for slower speeds. This planer has a quick return and special method of oiling the ways, which is very ingenious, and enlisted favorable comment. The electric call system is used throughout the shop, and much time is saved thereby. A workman desiring a tool anticipates his wants and rings for an errand boy, who procures the implement. The older portion of the foundry is not well lighted, but the newer portions have light from above, with well arranged floors, cranes and carriers. In the milling-room are some interesting gear cutters and milling tools, and also a special bolt planer. Recently a temporary annex has been built, which is used as an erecting shop. Traveling cranes are arranged overhead, and the power is furnished by an independent engine. This, as well as all other portions of the shop, is crowded with work. One of the most interesting features of the buildings is the pattern store house, in which a novel arrangement of shelves permits the storage of a large number of patterns in a small space, and an open floor allows the light from the roof to reach all portions of the store house.

At Ivorydale the processes of manufacturing Ivory soap were witnessed. In a series of beautiful buildings there is established a large amount of automatic machinery and a boiler plant of 3,500 horse power. The ingenuity displayed in the designs at these works was much admired by the visitors.

In the evening a reception at the Art Museum was tendered to the members and the guests present by citizens of Cincinnati.

FRIDAY, MAY 16.

The first paper was by Mr. D. K. Nicholson on "Heating Furnaces." In the absence of discussion, Mr. H. W. Suplee's paper on "Equilibrium Arch Curves" followed. This was briefly discussed by Professors Webb and Landreth. Mr. T. C. Clarke's paper on "The Kinzua Viaduct" was then taken up. Prof. Webb's paper on "The Length of an Indicator Card" was briefly discussed.

A paper by Mr. D. S. Jacobus on "Indicator Cards of the Pawtucket Pumping Engine" was then presented.

Mr. NAGLE, in the discussion, stated that the late Mr. Corliss, in his mill engine practice, discarded steam jackets for the cylinders, finding the gain from their use altogether too slight to warrant the expense of making and maintaining them. However, he used vertical boilers with superheating surface, working dry steam in his engines. The paper was further discussed by Messrs. Raynal, See and several others, with special reference to the arrangement of indicator cards to avoid errors from long lengths.

The last paper of the meeting, on "The Effective Area of Propeller Screws," was then presented by Mr. Jacobus. A written discussion was presented by Mr. Chas. E. Emery.

Mr. RAYNAL stated that there was much fallacious reasoning in screw propeller investigations due to pitch measurements on the drawing board instead of on the finished propeller, and dwelt upon the necessity of giving this matter proper attention.

Mr. HENNING referred to manganese bronze propellers, which were so thin that their pitch was changed by the springing of the blades when the wheel was at work.

During the session the usual resolutions of thanks were extended to all who had been instrumental in contributing to the success of the meeting. Altogether about 300 members had been in attendance.

On Saturday morning, May 17, those of the members who desired it were given opportunity to visit the Addyston Pipe Works, near Cincinnati.

The Chignecto Ship Railway.

Few engineering undertakings of modern times have attracted more attention than the Chignecto Ship Railway, now building. As our readers know the company is constructing a ship railroad 17 miles across the Chignecto Isthmus, which separates the waters of the Northumberland Straits from the Bay of Fundy. A subsidy having been granted by the Dominion Government work was commenced in October, 1889, and has steadily progressed to the present time. The engineer in charge of the undertaking, Mr. H. G. C. Ketchum, arrived in Ottawa recently, from England, and from him some particulars have been obtained. The line has been graded for 14 miles of the total length of 17 miles. It is straight and mostly level, with only a few maximum gradients of 10 ft. to the mile in its entire length. All the rails have been delivered; they are 110 lbs. to the yard. There will be two tracks, of standard gauge. The cradle on which ships are to be transported will project over the tracks, being 40 ft. wide.

All the hydraulic machinery has been manufactured, most of it is already on the ground, and all is about ready for erection as soon as the masonry of the lifting docks is completed. The docks at either end will cost quite as much as the railroad itself. Mr. Ketchum said there were only four other docks in the world similarly constructed, the Victoria dock at London, the Malta dock, the Bombay dock, and the dock at San Francisco.

The process of transferring the ship to dry land is briefly thus: The gridiron, on which the cradle is set, being sunk, the vessel is placed over it and the cradle raised till the vessel touches the keel blocks. Then the bridge blocks are moved into position, the ship secured, and the dock, with its burden, is raised to the level of the tracks. By hydraulic machinery the cradle, which is mounted on car wheels, is next moved on to the railroad and the ship is on dry land. The transfer by rail railroad is to be accomplished by two powerful locomotives, and when the other side is reached, the cradle is run on the floating dock, which is submerged till the ship floats. It is calculated that the raising and transfer over the 17 miles can be done in two hours, while the distance saved by the overland trip is about 500 miles.

The tariff will be adapted to the character of the cargo, and the company will, of course, have to charge only such rates as will attract custom and compete with a longer route from Prince Edward Island to the United States. The tariff will be arranged on a sliding scale of which the average will be 12½ cents per ton on the vessel's hull, while for the cargo the rate will be levied at so much per ton, bushel, barrel, etc., as in the case of the canals.

It is expected that the railroad will be finished next year, but unexpected delays having occurred in laying the foundations of the masonry docks, Mr. Ketchum is now seeking an extension of time, which, we understand, the Dominion Parliament refuses to grant.

Competitive Trials of the Rotary and other Machine Snow Plows.

[The statements which follow are condensed from information furnished by the Leslie Brothers Manufacturing Co. Some of them are confirmed by letters from officers of the railroad company, but for the details we are indebted entirely to the Leslie Company. We are promised a further account of the performance of the Jull machine from its makers.—EDITOR RAILROAD GAZETTE.]

Last April a competitive trial was made between the Rotary and the Jull machine snow-plows, on the Alpine Pass, Leadville & Gunnison Division of the Union Pacific Railway, narrow gauge. It is claimed that this trial was unfortunate for the Jull and completely successful for the Rotary. The failure of the Jull in certain particulars is candidly acknowledged by that company and will doubtless be explained by them in due time. The Rotary needed no such test in order to demonstrate its merits. This machine has been so long before the public and demonstrated its capacity in so many severe trials that it is not necessary to record any one or more of its experiences in order to satisfy railroad men of its efficiency. Nevertheless, there were peculiar difficulties in this trial which make some

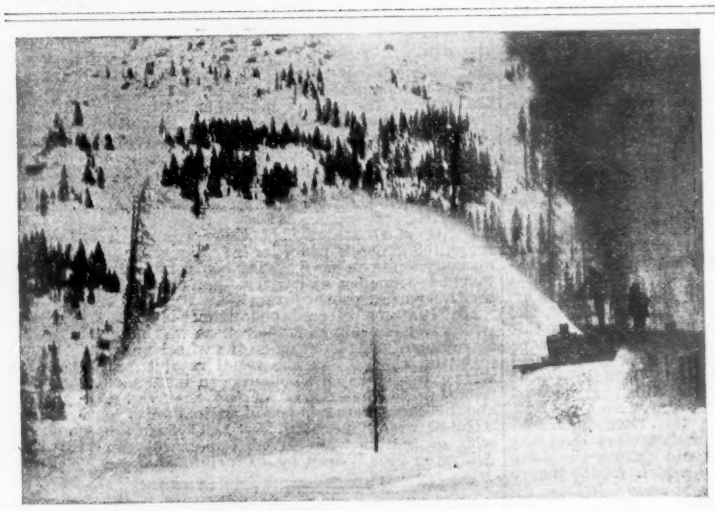


Fig. 1.—The Rotary in Action.

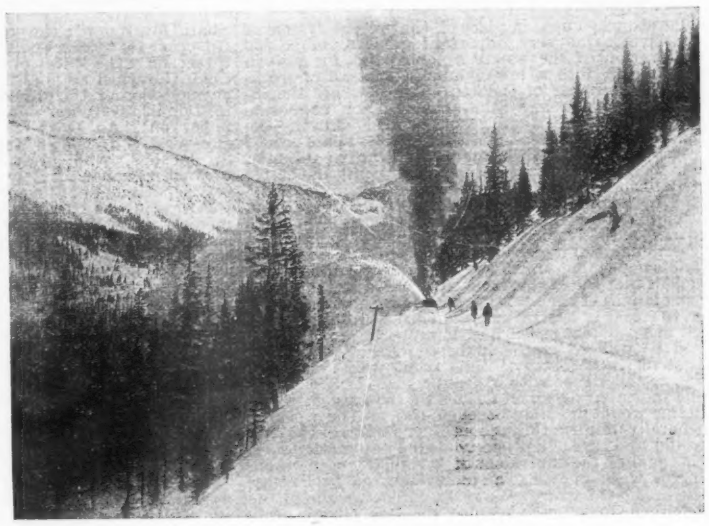


Fig. 2.—The Rotary in the Alpine Pass.

Fig. 3.—The Rotary throwing Snow over the Main Track.

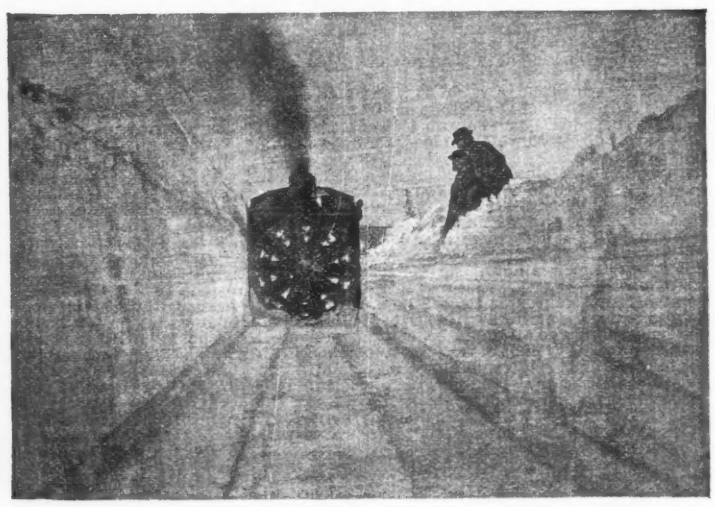


Fig. 4.—A Snow Cut, showing Layers of Ice.

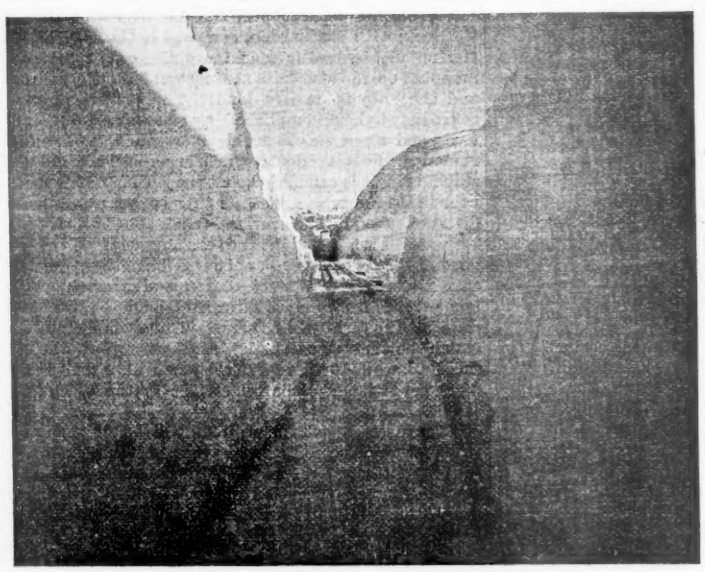


Fig. 5.—A Deep Snow Cut.

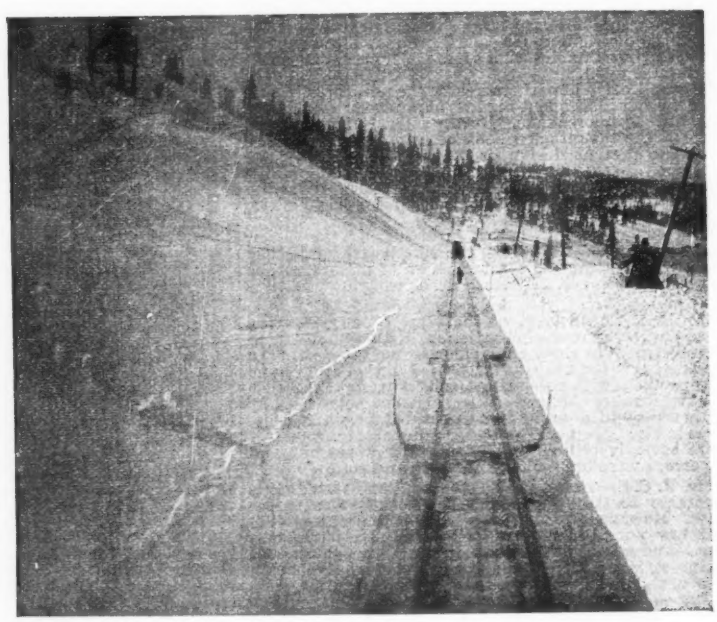


Fig. 6.—Track Opened by the Rotary.

ILLUSTRATIONS OF THE WORK OF THE ROTARY STEAM SNOW SHOVEL.

details of it interesting. The tests were witnessed by representatives of various roads who were sent for the purpose, and many photographs of the two machines in action were taken by Mr. W. H. Jackson, of Denver, the official photographer of the Union Pacific. For want of space we reproduce but few of these photographs, although many of them are interesting and important. Among those who were present and whose testimony we have seen were Mr. Gilchrist, Assistant Superintendent, and Mr. M. F. Egan, Division Master Mechanic.

Mr. Nasmith, Machinist of the Union Pacific, had personal charge of the Jull machine. Considerable difficulty was experienced in getting this machine to the scene of action. The curves are very sharp, and the screw overhangs the bearing on the track to a considerable distance, and the weight on the front truck bent and spread the rails so as to cause several derailments. Stringers were broken in at least two of the bridges. The machine was put into the snow where there was about 3 ft. depth on one rail and 18 in. on the other, and considerable ice. The snow was shoveled off from one rail, and the ice picked out to leave that rail clean. Nevertheless, the "Excavator" was derailed after going but a few feet. This happened, we believe, three times. The Rotary was then brought up. After it had gone about 100 yards it was backed out in order to examine the condition of the track. It was found that the machine was cutting its way through from 1 to 3 in. of solid ice, over the top of the rail, under the snow. The Rotary was then started ahead again, and ran 2½ miles in 13 minutes, through snow and ice from 2 to 5 ft. deep. The Jull was again put in where lighter snow was reached, and was eventually derailed. This finished the first day's trials, which lasted until 8:40 p. m.

The next morning the Rotary was put in again and ran through three or four feet of snow at a speed of eight miles an hour. The performance of the rotary on this part of the trial is shown in Fig. 1, where it will be seen to be throwing snow to the right in a magnificent stream, entirely clear of the track. When the photograph was made the plow was running eight miles an hour through snow four feet deep, with two locomotives pushing. After leaving Hancock the Rotary was derailed in snow seven feet deep on a 24-degree curve. On examination it was found that a blanket had been dropped on the track in a cut, saturated with water from springs and frozen solid to the rail and ground. The safety bolts of the ice cutter were sheared off. This was not discovered until the plow had left the rails a second time. After replacing the ice cutter another start was made. The machine then went through the cuts, around the curve to a point where the snow had decreased to about 18 in. depth. It was then retired in order that the Jull might be put in again the next morning.

Meantime the Rotary opened the side tracks in the Hancock yard which had been under snow for three or four months. Here the snow was thrown across the main

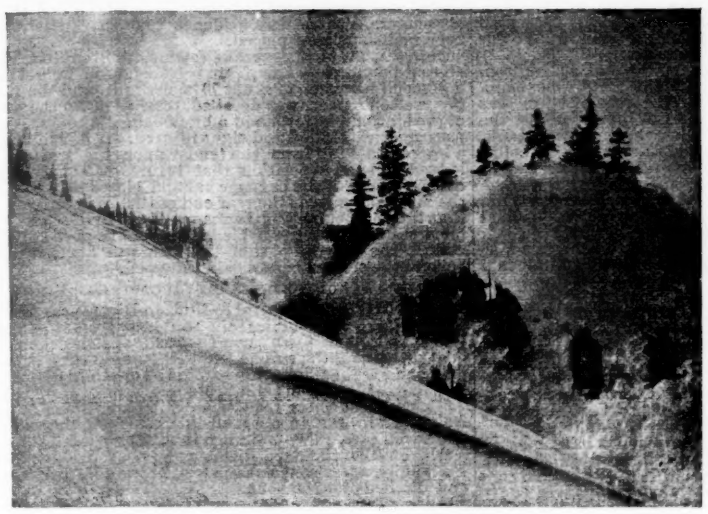


Fig. 7.—The Rotary in the Cascade Cut.

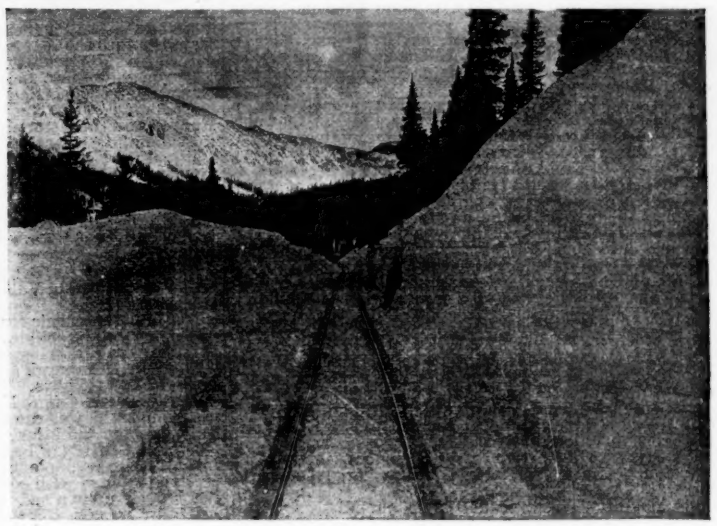


Fig. 8.—A Clean Piece of Track.

track in order to show that it could be thrown to a sufficient distance to clear one or more tracks. The snow was from three to five feet deep and the rails covered with ice. The Rotary ran through this at about six miles an hour. When half the track had been cleared the wheel was reversed to throw the snow to the left. Although the performance of the Rotary on this occasion was very fine, Mr. Egan said that he did not think it comparable with the work done by same machine in March on the high line between Dickie and Leadville. Some 22 snowslides had come down on that part of the line, bringing rocks, timber and earth with them. Through these masses the Rotary was forced, the only part of the machine that suffered being the fan blades, which were more or less broken by rocks imbedded in snow. Within about 60 ft. of the last slide in this blockade a large rock was met, which tore off several knives and did considerable damage to machinery. The plow was repaired at the Denver shops within 31 hours after its arrival. The fan blades were not replaced, but the Rotary was returned to service with them broken, and in this condition it entered the competitive trials of which we write. Mr. A. L. Humphrey, Master Mechanic of the Colorado Midland, said that the performance of the Rotary at Hancock was nothing more than it had been doing all winter on his line. In fact, it has been running three winters on that line without ever having been disabled, and had only been derailed once, when it ran over a replacing frog which had not been taken off the rail after a derailed freight car had been put on. Mr. Leeman, of the Denver & Rio Grande stated that neither of their Rotaries had been derailed or disabled in any way during the winter's work.

Friday morning, April 18, the Jull machine was again put in between Hancock and the Alpine Tunnel. The track was examined at the point where the Rotary had retired during the previous evening and found to be in good condition. The gate was removed from the top of the machine for the purpose of throwing the snow to the left. The machine was put in with the auger turning at about 500 revolutions per minute. The snow was rolled up in front of the screw and over the sides until the machine stalled, and it finally left the rails twice. It was again arranged to throw the snow to the right, but after a few more futile efforts it was derailed again, and Mr. Jull requested that it be returned to Denver.

The Rotary was put in at this point, and passed over the Alpine Pass through from 4 to 8 ft. of snow, at about four miles an hour. At various points in its progress the plow was stopped and backed out in order to examine the track. This is a very bad piece of road, as there are many springs in the mountain side which form ice on the track, and it was found that there was from 2 to 5 in. of solid blue ice over the tops of the rails. This line had been blocked for more than 11 weeks, and a succession of thaws, and storms had settled and packed the snow very solidly. A stream of ice and snow thrown out in this part of the road was so solid as to break the limbs and tops of the trees. The Rotary was stopped within a mile of Alpine Tunnel in order that the party might return to Denver that night. There was no mishap or delay during this day's trial with the Rotary. Fig. 2 is from an instantaneous photograph, taken from the rear. Some 35 or 40 instantaneous pictures were taken by Mr. Jackson on this expedition.

THE ROTARY AND THE CYCLONE.

In March very thorough tests of these two machines were made by the Southern Pacific Co. in the Sierra Nevada Mountains. The first trial was made at Strong's Canon, March 18, on the summer track, which had been snowed under all winter. An attempt had been made to open this siding with the Cyclone, but with four heavy engines pushing her she had failed to open 10 ft., having choked solidly, so that it was necessary to melt out the snow from the machine with steam. The Rotary was put in here with one engine and opened the siding without any difficulty. The only delay was from foaming in the new boiler. This trial was witnessed by H. J. Small, Superintendent of Motive Power; J. B. Wright, Superintendent; D. Burkhalter, Assistant Division Superintendent; M. W. Cooley, Master Mechanic Sacramento Division; J. H. Whitehead, Superintendent; G. H. Hunt, Master Mechanic Truckee Division, and other officers of the company.

On the following day, these same officers, together with General Superintendent Fillmore, Master Car Builder Welch, Master Mechanic Heintzelman and other representatives of the Southern Pacific Co., and E. Dickinson, General Manager of the Missouri River Division of the Union Pacific, went to Cascade to see further trials of the two machines. The Cyclone was first put in, with four heavy engines pushing. It speedily choked, and it was again found necessary to melt out the snow with steam, and it was ordered back to the side track in the snowsheds without having cleared 10 ft. of track. The party then went to the east end of the siding, where the Rotary was. Here snow over 30 ft. deep had lain four months, melting and freezing until it had packed down to about 16 ft. The Rotary was put to work with two engines. No difficulty was encountered until the solid mass of snow above the machine had reached the top of the cab, when she was stopped to prevent tearing off the house. Then snow was shoveled to the depth of about 11 ft. for about 150 ft., and the Rotary was put in again with three engines. After this no difficulty was encountered.

On the 23d a number of officers of the Southern Pacific went to Cascade to see the Rotary open the Cascade siding. Some of the same officers mentioned above were present on this day. With one engine the Rotary went 180 ft. without a stop. Here the rail was found covered with ice and snow, packed so solidly that it could not be cut with a shovel. Two extra engines were put on and the siding was opened through for traffic. During this work two shovels that had been left in the snow were cut into pieces and thrown 150 ft. from the track, doing no injury to the machine. Figs. 3 and 4 are from photographs by Mr. Hodson, of Sacramento. Fig. 3 shows the Rotary throwing snow from the side track across the main track, and Fig. 4 shows the machine backed out of the siding and indicates well the layers of ice intermixed with the snow.

After the trial of the 19th the Cyclone was taken to the Sacramento shops for changes in the machinery, among which was bushing the cylinders down from 17 to 14 in. and the addition of a large horizontal dome as an auxiliary reservoir for steam. The boiler of the Cyclone was also connected with the boiler of a consolidation engine in order to get more steam for her six cylinders. The machine was then sent over the mountains to Truckee for trial on the side tracks in the Truckee yard. Here the snow had lain for some months. The Cyclone here failed absolutely. Cylinder-heads were blown out, steam pipes burst and other damage done, after which the machine was side-tracked. The Rotary went to Cascade from Truckee and cleaned off this track as effectually as it had done other work.

The work done by the Rotary during the blockade of last January, on the Central Pacific Division in the Sierra Nevada Mountains, was probably the most remarkable that ever was done in its history. The details of this have already been made familiar to our readers. A great many photographs were made, and we have seen some which showed conditions which would not be believed possible unless they were seen. The depth of the snow was such as to bury two-story buildings, leaving only their chimneys sticking out. Whole villages were buried and houses were entered by long tunnels. Cuts 40 ft. deep had to be made through the solid snow. One of these is illustrated in Fig. 5. This is from a photograph made by Mr. Tibbs, official photographer of the Southern Pacific Co., showing the Cascade cut after ithad been cleared. Fig. 6 shows another piece of track after it had been opened by the Rotary.

On the left will be seen telegraph poles high up the hill buried up to the cross arms, and on the right is shown how completely the snow is thrown away from the edge of the cut. Fig. 7 is an instantaneous view of the rotary opening the Cascade cut during the latter part of the great blockade. A powerful stream of snow is seen being thrown over to the right.

Train Accidents in April.

COLLISIONS.

REAR.

2d, on Central Pacific, near Delta, Cal., the rear portion of a freight train, which had been broken in two and stopped, was run into by two following light engines. The caboose was wrecked, took fire and was destroyed. Conductor killed.

2d, on Pennsylvania road, at Elizabeth, N. J., a freight train ran into the rear of a preceding freight standing on the main track. Engine, caboose and seven cars damaged.

3d, on New York Central & Hudson River, at Grimesville, N. Y., a freight train descending a grade broke into three parts, and in a collision between them a number of cars were wrecked.

5th, on Baltimore & Ohio, in Philadelphia, Pa., a passenger train emerging from a tunnel ran into the rear of a freight train, derailing and damaging the locomotive.

8th, on Houston & Texas Central, at Waxahachie, Tex., a passenger train ran over a misplaced switch and collided with a yard engine, disabling both locomotives.

9th, on New York, Lake Erie & Western, at Otisville, N. Y., a freight train broke in two and the detached portions collided, demolishing a number of cars and the piazza of an adjacent building.

9th, on Baltimore & Ohio, near Sykesville, Md., a freight train ran into the rear of a preceding freight, derailing a number of cars.

10th, on Chicago & North western, at Racine, Wis., a passenger train moving at high speed ran over a misplaced switch and into the rear end of a freight train standing on a siding, wrecking engine, caboose and several box cars. Passenger injured.

10th, on Delaware & Hudson Canal Co.'s road, near Saratoga, N. Y., a freight train ran into the rear of a preceding freight, damaging engine, caboose and several cars.

12th, on Wilmington & Northern, at Montchanin, Del., a freight train ran into the rear of a preceding freight. Engine, caboose and two cars wrecked.

13th, on Lake Shore & Michigan Southern, near Air Line Junction, O., a freight train ran into the rear of a preceding freight and several cars were derailed and thrown against a moving freight on an adjoining track, doing some damage.

14th, on New York, Lake Erie & Western, near Adrian, N. Y., a freight train ran into the rear of a preceding freight. Engine and 13 cars wrecked.

14th, on Fitchburg road, at Glenville, N. Y., a passenger train ran into a box car which a gale had blown on to the main track from a siding. Engine, baggage car and a sleeper were derailed, the former being badly damaged.

15th, on Norfolk & Western, at Roanoke, Va., several cars of freight train broke loose and ran back down a grade and collided with an engine, doing considerable damage.

16th, on Birmingham Mineral, near Trusville, Ala., a freight train ran into a box car projecting over the main track from a siding, doing some damage. Two trainmen injured.

17th, on Baltimore & Ohio, at Valley Falls, Va., a freight train ran into the rear of a preceding freight, wrecking engine, caboose and eight cars.

19th, on Delaware & Hudson Canal Co.'s road, near Lanesboro, Pa., owing to a misplaced switch a passenger train running at speed was turned on to a spur track containing a locomotive. The runner of the latter, in trying to evade the passenger train, ran the engine off the end of the track. The passenger train could not be stopped before colliding with the tender of the derailed engine and its locomotive was overturned and badly wrecked. Two trainmen injured.

19th, on Baltimore & Ohio, near Barnesville, O., a passenger train ran into the rear of a freight train, doing considerable damage. Engineer killed and a number of passengers injured.

21st, on Northern Pacific, near Cle-Elum, Wash., caboose and two cars of a freight train ascending a steep grade broke loose and ran back down grade into the head of a passenger train, wrecking the runaway cars and the engine and mail car. A man riding in the caboose was killed and a brakeman injured.

24th, on Pennsylvania, at Greensburg, Pa., a freight train broke in two and the detached portions collided, throwing 15 cars over an embankment. Brakeman injured.

26th, on Louisville & St. Louis Air Line, at Marengo, Ind., a freight train ran into the rear of a preceding freight, wrecking 10 cars.

27th, on Lehigh Valley road, at Lehigh Gap, Pa., a fast freight train ran into the rear of a construction train moving on to a side track, wrecking an engine and 20

cars. Two trainmen injured. It is said that the flagman of the construction train did not go back far enough to stop the freight.

27th, on Queen & Crescent, at Hattisburg, Miss., a freight train standing on the main track was run into at the rear by another freight, damaging engine and six cars. Engineer killed.

28th, on Georgia Pacific, near Muscadine, Ala., a freight train broke in two on a curve and the rear portion was run into by a following freight, damaging engine and five cars. Two trainmen injured.

29th, on Cleveland, Cincinnati, Chicago & St. Louis, at Holmes, Ind., a freight train ran into the rear of a preceding freight, wrecking engine and four cars.

30th, on Southern Pacific, at Castroville, Cal., a freight train was turned into a siding by a defective switch and crashed into some freight cars. Engine and nine cars wrecked. One trainman killed and two injured.

30th, on Union Pacific, near Waterfall, Wyo., a freight train ran into the rear of a construction train, doing considerable damage.

BUTTING.

2d, on East Tennessee, Virginia & Georgia, in Macon, Ga., butting collision between a freight train and a yard engine, disabling the latter and damaging several cars.

4th, on Union Pacific, at Umatilla, Or., butting collision between a westbound passenger train and a freight, wrecking three locomotives.

8th, on Chicago & Atlantic, at Glenmore, O., butting collision between two freight trains. Engineer badly hurt.

9th, on Illinois Central, at Batesville, Miss., butting collision between two freight trains, due to an operator's carelessness. Both engines and eight cars were wrecked.

11th, on Baltimore & Ohio, near Mansfield, O., butting collision between two freight trains, due, it is stated, to one of the engineers overlooking his orders. Both engines, several freight cars and seven empty emigrant cars were wrecked.

11th, on Pittsburgh, Fort Wayne & Chicago, in Chicago, Ill., butting collision between a passenger train and a switching freight, due to a misplaced switch. Several coaches were damaged and a number of passengers injured.

11th, on Pittsburgh, Cincinnati & St. Louis, at Trenton, O., butting collision between a passenger and a freight train, wrecking both engines and a car loaded with hogs, about 40 of which were killed.

11th, on Pittsburgh, Cincinnati & St. Louis, near Dennison, O., a passenger train ran over a misplaced switch and into the head of a freight train standing on a siding, disabling both locomotives.

12th, at Terre Haute, Ind., butting collision between an incoming Vandalia freight and an Evansville & Terre Haute yard engine pushing half a dozen coal cars. Both locomotives were deserted before the collision. The engine of the former, the throttle lever of which had been opened by the shock, broke away from the tender and pushed the switching freight, half a mile, into the Union depot, there colliding with a Terre Haute & Peoria standing passenger train. Two engines and several cars were damaged and a portion of the station building demolished. Engineer injured.

12th, on Camden & Atlantic, at Pike's Peak, N. J., collision on a curve between two construction trains, one of which was moving backwards. The colliding engine was derailed and went over an embankment and a number of cars were wrecked. Confusion of orders is given as the cause.

13th, on Pennsylvania road, at Hamburg, Pa., butting collision between two switching engines, wrecking the tenders of both. One trainman killed and several injured.

13th, on Pennsylvania, near Engleside, Pa., butting collision between a freight train and a switching engine, due to a confusion of signals. Engineer killed.

15th, on Chicago & Alton, near Farber, Mo., butting collision between a passenger train and a freight, badly wrecking both engines, baggage and several freight cars. One trainman killed and two injured. The freight was running against orders.

15th, on Lehigh Valley road, near Penn Haven, Pa., butting collision between two freight trains, wrecking the engines and several cars of both.

16th, on Talladega & Coosa Valley road, near Talladega, Ala., butting collision between a freight train and a light engine, wrecking both locomotives. The light engine was running without orders. Several trainmen injured.

17th, 11:30 p. m., on Chicago, Milwaukee & St. Paul, in St. Paul, Minn., butting collision between northbound passenger train, running 12 miles an hour, and a southbound freight, running about six miles an hour, badly damaging both engines and derailing and damaging several freight cars.

18th, on Union Pacific, near Spring Hill, Mont., butting collision between double-header freight and a light engine, wrecking three locomotives. Fireman killed.

22d, on New York, New Haven & Hartford, at Guilford, Conn., butting collision between two freight trains, wrecking both engines, a number of cars and a switch house, badly injuring a switchman. A train dispatcher is said to have been responsible for the accident.

22d, on Chicago, Santa Fe & California, near Galesburg, Ill., butting collision between two freight trains, making a bad wreck.

22d, on Kansas City, Fort Scott & Memphis, near Urich, Mo., butting collision between a freight train and an empty engine, due to the latter running without orders, damaging both engines and one car.

23d, on Alabama Midland, near Ramer, Ala., butting collision between two construction trains, damaging both engines and three cars. Two trainmen and four laborers injured.

23d, on Georgia Pacific, near Pell City, Ala., butting collision between a freight train and a light engine, in which both engines were wrecked. Several trainmen injured by jumping.

28th, on Norfolk & Western, near Vinton, Va., butting collision between two freight trains on a curve, disabling the engines and damaging a number of cars.

30th, on Baltimore & Ohio, at West Junction, Md., butting collision between a passenger car and a switch engine, disabling both locomotives and damaging several cars of the former train.

CROSSING AND MISCELLANEOUS.

1st, on New York Central & Hudson River, near New Hamburg, N. Y., a switch engine in attempting to run around a freight train moving in the same direction on the middle track, ran into the caboose, derailing the engine and damaging several cars.

3d, on Cleveland, Akron & Columbus, at Akron, O., collision between two freight trains, one of which was entering a siding. Both engines and 8 cars wrecked.

3d, on New York, Lake Erie & Western, at Waverly, N. Y., an Erie freight was backed into a Lehigh Valley freight, wrecking 10 cars.

5th on Central Pacific, at Redding, Cal., a passenger train ran into the rear end of a freight train which was entering a siding, doing some damage.

5th, on New York, Lake Erie & Western, at Addison, N. Y., the front portion of a freight train was being backed onto a side track before the rear portion was stopped and the latter struck a car of the former in the side, derailing several cars and damaging a water tank.

5th, at the crossing at Suspension Bridge, N. Y., collision between Michigan Central and Grand Trunk freight trains, damaging both engines.

8th, on Cairo, Vincennes & Chicago, at Marshall, Ill., a freight engine in coupling on to its train was backed into it with such force as to wreck the tender.

10th, at the crossing in Fostoria, O., owing to a mistake in signaling, a Baltimore & Ohio freight ran into a Columbus, Hocking Valley & Toledo freight, doing considerable damage.

11th, on Housatonic road, at South Norwalk, Conn., a switching engine collided with a freight train, smashing three cars and injuring several trainmen.

15th, on Pittsburgh & Western, at Niles, O., collision between two freights.

22d, on Sioux City & Northern, at Doon, Ia., a construction train was run into by an empty engine, doing some damage and injuring a number of employés.

25th, on Central of New Jersey, near Plainfield, N. J., in trying to recouple a broken freight train the two sections collided with considerable force and 25 coal cars were piled up in a bad wreck. An employé was badly injured.

26th, on Central of New Jersey, near Elizabethport, N. J., a westbound freight train ran into the side of another westbound freight passing from the third to the fourth track. Engine and four cars wrecked.

DERAILMENTS.

DEFECTS OF ROAD.

6th, on Missouri, Kansas & Texas, at Hartman, Mo., a passenger train was derailed at a defective switch. The engine was overturned and the baggage car damaged. Three trainmen injured.

10th, on Northern Pacific, near Jamestown, N. D., passenger train derailed by a broken rail. Two sleeping cars were overturned and damaged.

11th, on Gulf, Colorado & Santa Fe, near Goldthwaite, Tex., 13 cars of a freight train were thrown from the track by the breaking of a rail. Five of them were badly wrecked, killing 60 head of cattle. Brakeman injured.

12th, on the Pennsylvania, at Bordentown, N. J., engine and several cars of a passenger train were derailed at a switch and went into the ditch. Engineer killed.

17th, on St. Louis, Iron Mountain & Southern, near Doniphan, Mo., a work train was derailed by the breaking of a fish-plate, wrecking three cars. Two trainmen injured.

21st, on Georgia road, near Conyers, Ga., passenger train derailed at a switch.

23d, on Kansas City, Memphis & Birmingham, in Birmingham, Ala., two cars of a passenger train were derailed at a switch.

23d, on Georgia Pacific, at Cook's Springs, Ala., two cars of a freight train were derailed at a switch.

28th, on Missouri Pacific, near Leavenworth, Kan., engine and three cars of a freight train were derailed by a defective switch and damaged.

DEFECTS OF EQUIPMENT.

2d, on Chicago, Santa Fe & California, near La Plata, Mo., a wheel broke under a car in the forward part of a freight train, and 22 cars were piled up in a bad wreck. In clearing the track a wrecking car was upset, killing a bystander and injuring several other persons.

5th, on Charlotte, Columbia & Augusta, near Lexington, S. C., 12 cars of a freight train were derailed and ditched by a broken truck. Two trainmen injured.

6th, on Burlington & Missouri River, at South Omaha, Neb., an axle under tender of engine of a freight train broke. The locomotive and 12 cars were derailed and thrown down an embankment. Fireman injured.

10th, on Old Colony, near Mansfield, Mass., 11 cars of a freight train were derailed and wrecked by the dropping of a brake-beam.

10th, on Baltimore & Ohio, at Broad Tree Tunnel, W. Va., an axle broke under a car in the forward end of a freight train and 16 cars were piled up at the mouth of a tunnel in a very bad wreck, blocking the road for ten hours. Brakeman injured.

12th, on Memphis & Charleston, near Moscow, Tenn., car of freight train derailed by a broken journal.

14th, on Elgin, Joliet & Eastern, at Brisbane, Ill., 15 cars of a freight train were derailed and wrecked by the breaking of an axle.

22d, on St. Louis, Alton & Terre Haute, near Freeburg, Ill., the locomotive of a freight train was derailed by the breaking of a wheel, and 13 cars were piled upon it in a bad wreck. Engineer hurt.

25th, on Georgia Pacific, near McComb, Ala., five cars of a freight train were derailed by the breaking of a wheel, and wrecked.

NEGLIGENCE IN OPERATING.

3d, on West Virginia Central, near Shaw, W. Va., a freight train descending a steep grade became uncontrollable, and after running some distance and attaining a high speed, all the cars were derailed and wrecked. The engine broke away from the cars, ran some distance farther and collided with some coal cars, wrecking it completely. One trainman killed, five injured.

14th, on Southern Pacific, in San Jose, Cal., passenger train was derailed by a misplaced switch.

17th, on Southern Pacific, near Tehachapi, Cal., a passenger train of 14 cars descending a grade of 116 feet per mile (or steeper) became uncontrollable, and the 11 rear cars were derailed and thrown over against the side of the bank in a small cut. The engine and front portion of the train ran some distance before being stopped. Although there were a large number of passengers in the train, only a few were injured, and only one seriously. The train had had a helping engine as far as Tehachapi station, and the engineer of the helper had handled the brake. On detaching this engine it appears that the engineer's valve of the regular train engine, which had been cut out, was not "cut in" again. The engineer had handled air brakes on freight trains for a long time, but had had very little experience on passenger trains. He seems to have got too excited to act with good judgment.

21st, on St. Louis, Arkansas & Texas, near Hibbard, Mo., a passenger train was derailed at an unfastened switch. The mail, baggage, express and two passenger cars were thrown over on their sides into a pool of water. Fire broke out, but the flames were soon extinguished. Seven passengers injured.

22d, on Chicago, Rock Island & Pacific, in Des Moines, Ia., passenger train derailed by a misplaced switch. A coach was overturned, injuring a trainman and three passengers. There was evidence that the switch had been maliciously misplaced.

28th, 3 A. M., on Chesapeake & Ohio, at Staunton, Va., an east-bound passenger train became uncontrollable on a descending grade of about 70 ft. per mile, and the rear car, a sleeping car, was derailed, tearing down the roof of the station platform and a brick baggage house. One passenger was killed and eight injured. It is said that a brake-beam fell from the tender upon the track and lodged in such a position that it tore off some of the brake rigging of the baggage car and closed the cock in the air brake pipe at the rear end of the baggage car, so that the engineman and baggageman, both of whom applied the brake, were unable to control the speed of the train. The forward part of the train ran about a mile beyond the station before being stopped.

UNFORESEEN OBSTRUCTIONS.

3d, on New York Central & Hudson River, near Garrison's, N. Y., a freight train ran into a mass of rock which had fallen down upon the roadbed in a deep cut, badly wrecking the engine and half a dozen cars. A fast passenger train approaching from the opposite direction was flagged barely in time to stop.

6th, on West Shore road, near St. Johnsville, N. Y., a freight train ran into a landslide, wrecking the engine and seven cars. Two trainmen injured.

8th, on Cleveland & Pittsburgh, near Bridgewater, Pa., engine and seven cars of a freight train were derailed and ditched at a washout.

9th, on Texas & Pacific, near Jefferson, Tex., a freight train ran over a steer and most of the cars were derailed and wrecked.

9th, on Northern Central, near Stanley, N. Y., a passenger train was derailed and ditched by a tree which had been blown down across the track. Several passengers injured.

12th, on Pennsylvania, at Elizabeth, N. J., the rear car of a west-bound passenger train was struck and derailed by a telegraph pole which had become dislodged on a flat car standing on an adjoining track. Most of the windows on one side of the car were broken and several passengers injured by flying glass.

15th, on Alabama Great Southern, at Avondale, Ala., seven cars of a freight train were derailed by running over a cow.

17th, on Alabama Great Southern, near Tuskaloosa, Ala., a passenger train ran over a cow, derailing the tender.

21st, on Louisville & Nashville, near Gadsden, Tenn., engine and three cars of a freight train were derailed at a washout. Trainman injured.

22d, on Chicago, Rock Island & Pacific, at Omaha, Neb., a passenger train was derailed by a switch which had been purposely misplaced, injuring four passengers.

25th, on Kansas City, Memphis & Birmingham, 25 miles west of Birmingham, Ala., a freight train ran over some cattle, derailing engine and tender.

30th, on St. Louis, Iron Mountain & Southern, near Bethel, Ark., a passenger train ran over a cow and the engine and most of the cars were derailed and badly damaged. Engineer and fireman injured.

UNEXPLAINED.

2d, on Louisville & Nashville, at Guthrie, Ky., a passenger train running at speed was derailed. The engine and baggage car were thrown against some freight cars standing on an adjoining track and badly wrecked. Engineer hurt.

2d, on Cumberland Valley road, near Martinsburg, W. Va., a freight train was derailed, wrecking an engine and 12 cars. One trainman killed, two injured.

2d, on St. Louis, Arkansas & Texas, near Trinity, Tex., engine and seven cars of a freight train were derailed and wrecked. Fireman killed.

3d, on Kansas City, Memphis & Birmingham, near Cordova, Ala., nine cars of a freight train were derailed and four of them badly smashed.

4th, on Wabash road, near St. Charles, Mo., a passenger train was derailed at a curve and all the cars were partially overturned. Four trainmen and 11 passengers injured.

5th, on Chicago & Northwestern, at Fort Atkinson, Wis., four cars of a freight train were derailed.

5th, on Boston & Albany, at Millbury, Mass., two cars of a freight train derailed.

7th, on Boston & Albany, in Springfield, Mass., six cars of a freight train were derailed, several of them being considerably damaged.

8th, on Louisville & Nashville, near New Orleans, La., engine of passenger train derailed and overturned.

9th, on Central of New Jersey, at Roselle, N. J., switching engine derailed.

11th, on Rio Grande Western, near Provo, Utah, four cars of a freight train were derailed.

12th, on Fort Worth & Denver City, near Denver, Col., four cars of a freight train were derailed and damaged.

15th, on New York Central & Hudson River, at Medina, N. Y., the last car of passenger train leaving the station was derailed and partially overturned, injuring three passengers.

15th, on Baltimore & Ohio Southwestern, at Cincinnati, O., a car of a freight train was derailed and overturned, killing one brakeman and badly injuring another.

16th, on Buffalo & Southwestern, at Gowanda, N. Y. several cars of a freight train were derailed. Brakeman injured.

17th, on Ohio River road, near Washington, W. Va., four cars of a freight train were derailed.

17th, on Rio Grande Western, near Hot Springs, Utah, passenger train derailed.

18th, on East Tennessee, Virginia & Georgia, near Athens, Tenn., engine and 15 cars of a freight train were derailed and ditched.

18th, on Pennsylvania, at Rosemont, Pa., several cars of a freight train were derailed and damaged. Fireman injured.

18th, on Gainesville, Jeffersonville & Southern, near Jug Tavern, Ga., a car of a special passenger train, containing officers of the road, was derailed and overturned, injuring seven occupants.

21st, on Little Rock & Fort Smith, at Morrilton, Ark., baggage car and tender of passenger train derailed.

21st, on Baltimore & Ohio, near Farmington, W. Va., a freight train was derailed and tipped over an embankment into a stone quarry, making a bad wreck.

25th, on New York & New England, at Blackstone, Mass., the engine and smoking car of a passenger train were derailed.

25th, on New York, Chicago & St. Louis, at East Buffalo, N. Y., 2 cars of a freight train were derailed.

25th, on Denver, Texas & Fort Worth, near Beshoar, Colo., passenger train derailed and 2 cars ditched.

25th, on Atchison, Topeka & Santa Fé, near Little-

ton, Colo., a car of a freight train was derailed and ditched.

25th, on Oregon Railway & Navigation Co.'s road, at The Dalles, Ore., several cars of a freight train were derailed on a bridge, tipped off and wrecked. The bridge was considerably damaged.

25th, on Bangor & Piscataquis, near Shirley, Me., two box cars and one passenger car of a mixed train were derailed and badly damaged. One passenger injured.

25th, on Denver, Texas & Ft. Worth, near Barela, Colo., passenger train derailed, the baggage and mail cars being overturned.

28th, on Philadelphia & Reading, at Falls of Schuylkill, Pa., several cars of a freight train were derailed on a bridge and tipped off into the Schuylkill River.

29th, on Lake Shore & Michigan Southern, at Huron, O., engine and six cars of a freight train were derailed and ditched.

OTHER ACCIDENTS.

1st, on Boston & Albany, at North Adams, Mass., the flange of the front wheel of the engine of a passenger train was broken as it crossed a frog. The engineer succeeded in stopping before he reached a switch, though the breakage was such as to cause derailment, except on clear, straight track.

11th, on Chicago, Burlington & Quincy, near Corning, Ia., a car in a freight train containing nursury stock was found to be on fire and was partially burned.

16th, on Louisville & Nashville, near New Haven, Ky., the crown sheet of a locomotive blew out, injuring 3 trainmen.

24th, on Manhattan Railway, near Ninth avenue and 82d street station, cylinder head of engine of passenger train blew out.

A summary will be found in another column.

Prizes for Trainmen.

We give below an extract from the recently issued book of rules of the Seattle, Lake Shore & Eastern Railroad, together with a copy of the blank on which the Superintendent records the data to be used for his guidance in awarding the monthly prizes referred to. Some comment on the general subject of prizes will be found in the editorial column.

Beginning with May 1, all trainmen will receive monthly awards for highest standing as shown by comparative average performances which will be kept in the Superintendent's office, and can be seen at any time. The passenger train conductor showing the best average of time, prompt attention to duty, least complaints from the general public, the most gentlemanly appearance and the least errors committed, as determined by the Superintendent, shall receive in addition to his regular pay ten dollars per month. The baggageman and brakeman under him will receive five dollars each.

The engineer on passenger trains showing the greatest care, least accidents to his train or detention at stations by oiling, and other matters of that character, as well as his prompt and willing obedience to the rules of the company and signals of conductors, will receive $10 per month in addition to his regular pay, and his fireman will receive $5.

All men, to receive these premiums, shall have made twenty days or more time in the month. A continual low average by passenger conductors will be looked upon as a mark of incapacity, and will result in their being reduced to freight train conductors; a high order of average will be considered a mark for promotion to higher positions.

Freight conductors showing the greatest average of cars handled per train, least number of complaints from agents and shippers or from other sources, and the best management of their train, determined by speed between stations, time they make, accidents to their trains and other matters as detailed in performance sheet, will receive rewards as follows: The conductor and men under him receiving the highest average, will receive the same premium per month as those shown above given to passenger conductors. The freight engineer and fireman making the highest marks as determined by their performances, detailed on performance sheet, will also receive the same premium as that designated to passenger engineers and firemen. Size of engine and average number of loads handled will also be considered in making awards to freight enginemen.

Freight train men will be promoted in accordance with these reports. Age or previous conditions having no effect in the matter. The proper line for promotion, where practicable, will be from freight conductors to passenger conductors, from freight brakemen to passenger brakemen, passenger brakemen to baggagemen, baggagemen to freight conductors. In addition to this, it is expected to promote yard switchmen to freight brakemen, and up the line as designated above, or to yard master. Yard masters will be considered equal to freight conductors and will stand in the same line of promotion.

The Acting Superintendent will take great care that no partiality be shown, and will also endeavor to learn the actual value of every man in the transportation department and see that equal justice is given all. It is hoped, however, that in our kind treatment to the men they will not be misled to believe that personal feelings will influence or be considered in making promotions, as nothing but strictly first class service to the company will obtain these ends.

SEATTLE, LAKE SHORE AND EASTERN RY. CO.

AVERAGE PERFORMANCES OF CONDUCTORS AND ENGINEERS.

Name ....*Occupation*..... ....*Month of*.....189

NOT TO COUNT			MERIT				DEMERIT				
DATE	Day or Train	Engine	Cars Moved	On Time	Department	Cleanliness	Times Late	Rashness & Error	Complaints	Accidents	
1.....											
2. ...											
3.....											
30.....											
31.....											
Totals											
TOTAL MERIT & DEMERIT											

SUBTRACT DEMERIT FROM MERIT LEAVES.....

Divide the number of trains run into result as above, gives the Grand Total of Merit Average.....

Mr..... .... *and his*.....

win the prize for this month as the best..... .... *and*.....

Heads of departments will add premiums to their month's pay as directed in Bulletin Order. Yours truly,

.....Supt.

EXPLANATION.—Where passenger crews run several trains on time card in one day, or suburban runs, they will be credited with one train or day and the number of cars handled in the heaviest one trip.

Where crews run both freight and passenger, they will be credited with the total number of cars handled in each separate train and counted same as freight cars.

Freight crews will count total cars moved per day as one train.

Merit and demerit will be counted from 0 to 10, as the case demands.

F. W. DUNN,
ACTING SUPT.

Driver Brakes—Northwestern Railroad Club.

At the regular meeting, May 10, the discussion of the subject of driver brakes was opened by a paper by Mr. Wm. McIntosh. Extracts follow: Driver brakes have forced their way into general use against considerable opposition from those in charge of the mechanical departments and from the locomotive engineers, who have acted under the not entirely erroneous impression that their employment increased to a marked degree the labor and consequent cost of maintaining motive power. As at first applied and operated, these fears were not groundless, for driving boxes, connecting rods and springs suffered to a greater or lesser extent—with flattened tire a not infrequent occurrence. Yet, notwithstanding these objections, the necessity of having all the wheels of a train subject to the retarding influence of brakes became so apparent that those of this class have steadily gained in favor regardless of any additional expense of maintenance. Many of the early defects have been overcome, while recent improvements almost render them automatic in their operation, requiring only skillful management on the engineer's part to insure quick and positive control, with scarcely appreciable injury to the locomotive. In fact, many consider these brakes with the Ross shoe, acting as it does on the flange and outer rim of tire, a positive advantage in that it wears down to the normal condition those portions of the tire which would otherwise become prominent and soon necessitate turning.

For those engines having three or more pairs of drivers, the blocks hung in front of each wheel and connected back to brake cylinder by means of a system of rods and equalized bars seem to be as plain and effective as can well be arranged. Others advocate the attaching of the blocks at opposite points on each wheel, claiming that in this manner there is no unequal strain on any portion of the engine. However perfect this method may be in theory, it is my opinion that any practical advantages gained would be offset by the multiplicity of parts and the additional cost of keeping in order.

It is thought by many that driver brakes should be operated by steam from the engine direct and in connection with the train system, in order to insure a fair degree of braking power from the engine in case the train system should become inoperative, and a number of accidents are quoted which might have been avoided had the engines been so equipped. I am informed that one of the leading brake companies has perfected a system whereby either steam or air may be applied to the briving brake cylinders—for instance, air will be used, ordinarily, in connection with the train system, but steam may be instantly substituted by simply opening a valve.

I previously mentioned that all wheels of a train, including the locomotive, should be braked. I wish to qualify so far as the forward truck of the engine is concerned. This truck occupies much the same position to the locomotive that a rudder does to a ship, and any interference with its freedom of action would, it seems to me, subject the engine and train to liability of derailment and gain but little in braking power. In this connection I will read a letter received from Mr. J. L. Greatsinger, of the Duluth & Iron Range, in reply to inquiries made by me:

"I am sending you blue prints of some driver brakes that we have in service upon several of our locomotives on this road, and of which a few are in service on some Eastern road. I think the N. Y., O. & W. have a number of engines equipped with the kind shown in this blue print.

"I believe that Mr. Lanpher and I have the first patent on a driver brake with the shoe on each side of the wheel. The manner of applying it was not altogether satisfactory, after having it in service for a year or so, and we invented the present arrangement for applying the brake.

"Soon after this brake came what is known as the Beales double shoe brake, and about the same time the vacuum, also double shoe, but both located nearer the rail than the centre of the wheel. The objection to this style of brake is that when set the drivers are locked rigidly to the locomotive. In passing over frogs and switches the action of the drivers upon the joints and low places is very severe, both on the drivers and the track, from the fact that it destroys the benefits derived from the use of driving-springs. This effect is not so bad on the track and drivers by the American Brake Co.'s new driver brake appliance, as they only use one shoe on the forward side of the driver. Even this brake, when set hard, pulls the engine down upon the axles and springs, but it is not as rigid as the Beales or vacuum patterns. The wedge brake, as used more particularly on passenger engines, I consider most destructive of any pattern that I know of to the rods, pins and driving boxes. But to place the shoe on each side of the *centre* of the wheel, as you will readily see, overcomes all of the objectionable features mentioned in the above types of brake, as the drivers are balanced as well when the brakes are set, and are at liberty to drop and conform to deflections in the track as readily one time as another. The distribution of the leverage is equal and the weight bearing upon all shoes alike in all cases, the one shoe lifting up on the frame, while the other is pulling down an equal amount, consequently no damage to the springs or any uneven distribution of the weight of the locomotive. No additional pounds are felt when these brakes are set, as they do not crowd the drivers in either direction."

MR. CASEY: I, as you know, am representing the Eames Vacuum Brake Co., and I hope that anything I may say won't be taken as personal, because I wouldn't want my interests to conflict with my ideas of mechanics; but I believe in vacuum power applied to a driver brake, regardless of how the brake is applied to the engine, for the reason that you know what you apply, and it is a question with me when you apply steam if you know what you apply. You make a partial application of a steam brake and close your valve, and it depends upon the weather and the temperature of your brake cylinder how much power you have, and how long you have it, because it will condense. If you have an air brake you can see by your gauge what power you have applied, so with a vacuum, and the only advantage of a vacuum over an air brake is the process of obtaining the power; that is, over straight air. It has an advantage over the automatic, for the reason that with the automatic you make a clear release, and with the vacuum you make a partial release; so you can with the straight air.

In regard to applying on both sides of the wheel, I don't know but it is an advantage for switching engines, because the brake is on a large percentage of the time; but in most road engines I think the extra number of parts required to have the brake on both sides of the wheel would not be an advantage, because the wear will be slight. I think there is no doubt but what the brake applied on both sides of the wheel brings less strain on the boxes, also on the springs. I have noticed, in riding on engines with driver brakes, the tendency was to ride a little hard while the brake was on; but I don't think the power applied was sufficient to make them rigid, and the jolt that Mr. Greatsinger speaks of I do not think would be detrimental.

MR. CHURCH: We are putting on our brakes, to be operated by steam, air or vacuum. With regard to the remarks made by Mr. Casey in regard to our steam brake as to not knowing whether you had power or not, we can overcome that easily by attaching a gauge the same as the air and the vacuum brake. In fact, we do use the gauge on a great many of our mountain roads. Where we put on a reducing valve we put on a gauge, and we know exactly what power we have. For that matter, we can apply it to all the steam brakes, and the general opinion is to have driver brakes operated with air, and I think the time will come when air will be the power to operate driver brakes.

MR. CASEY: Is that gauge showing the pressure between the brake valve and the cylinder?

MR. CHURCH: Yes, sir; you can attach it in that way.

MR. CASEY: Do you so attach them?

MR. CHURCH: Well, no; not invariably.

MR. CASEY: I never saw them attached in that way. If they are on the other side how can you tell what pressure you have on the cylinder, providing you let in steam and close your valve and the cylinder is cold? It condenses the steam, and your power goes.

MR. CHURCH: Yes, that will occur.

MR. HOLLAND called attention to the argument for holding the driver brake for emergencies only.

The PRESIDENT: If you use the brake on your engine and on your train continuously, you have no emergency brake except the reverse lever. The driver brake is as we use it on our road, for an emergency.

MR. CHURCH: You find most master mechanics differ from you in that respect, too. They claim that the emergency brake is never ready when you want it.

MR. LEWIS: There has been a great deal said about the injurious effect of the cam brake as applied to the wheel between the drivers. In my experience I never have seen any very injurious effects from the application of a cam brake. I never have known of an engine to go out of service from any injury that she might have received from the application of a cam brake between the drivers. I think, myself, that the outside brake is an advantage, particularly with a 10-wheel engine. You

get a greater braking power than you would with a cam brake. So far as the emergency question is concerned, I don't know that an emergency brake is necessary where the automatic brake is used.

Mr. WHITAKER: In light passenger service, in a great many instances, the brakes of the cars and tender would not be sufficient to make a quick stop. That has been our experience, where we have to stop quite frequently for stock, and that is where we find that the emergency brake comes in very handy. We have several trains that have only two or three cars, and by having the driver brake on there for emergency we have found a great many instances where it has prevented the killing of stock.

Mr. MACINTOSH: I don't know that I have made myself sufficiently plain on this question of emergency brakes. I speak simply of the driver brake, as an emergency attachment, separate from the automatic brake. I concede that the driver brake is an additional precaution, but when connected with the automatic system I see no reason for any emergency attachment to the driver brake.

Mr. CHURCH: I claim that it is impossible for a brake to fail instantaneously; and if anything should happen when that is connected right through with the train brake, why it is an impossibility for it to become inoperative. If the hose breaks, or the connection breaks, why your brakes are applied, and you get the benefit of your driver brakes just the same as you do if you have the auxilary attachment for it.

Mr. CASEY: I think I have heard of cases where the brake has failed. I may be wrong; but I have heard it reported that the triple-valve was frozen and could not move. Now I would like to know how the automatic would work if the triple valves could not move?

I would like to say something else about the driver as an auxiliary. The possibility of the pump stopping I will admit is very slight to-day, but sometimes it does break and stop. Now we know that our ordinary passenger brakemen or porters are thickheads; a good many of them hardly know which way to turn a brake-wheel or how to set up a brake, and if you are running on sharp time, and your drivers and everything are equipped with air to work your brakes, and your pump fails and you depend upon those brakemen, you won't feel like running very fast, because you know you can't stop. Now, with an auxiliary brake which is independent—you may have it steam or vacuum—you know you can apply that, and you feel safer.

The PRESIDENT: I would like to ask this club if they think that the driver brakes should be used in connection with train brakes, or hold the driver brake as a reserve in case of an emergency?

Mr. CHURCH: I would like to answer that question as an engineer, not as a brake expert, or mechanic. My experience has been in handling a passenger train that with a driver brake it is much easier braking with the driver cut in than it is with it cut out. It is much easier on the cars; you can make better stops, and use less air, and I consider it an advantage in every respect.

Mr. PIERCE: Possibly my experience has not been the same as yours. In 20 years I never found it necessary to have a reserve brake.

The PRESIDENT: I had quite a long conversation with some of the engineers on our road running over the mountains, and I asked them that same question, if they preferred to use the driver-brakes and all the braking power they had for an ordinary stop, and they said, "No, sir, we don't want it; we want something to fall back on."

Mr. BARBER: There is one thing in favor of a steam brake, as long as you have got steam, you have got a brake.

Mr. WHITAKER: I don't altogether agree, more especially in this climate. It has been my experience that we have had steam a good many times, but didn't have the use of the steam brake, from the fact that it would freeze up. I have seen them freeze up standing in the yard, with the engine working; I have seen them freeze up with the heater working.

Mr. WARD: There is no question but that the air brake is, next to an injector, the best improvement that has ever been placed on an engine or a train, but air brakes are not infallible. Now, what shall we resort to? Shall we resort to steam brakes, or shall we resort to the vacuum? The vacuum gives us very little trouble. I have two or three of them working, and they work well. They will pay for themselves gentlemen, in less than 12 months. For every freight train that has an accident, it will pay for itself every day in the year.

Mr. MCINTOSH: Would it be policy to sacrifice the braking power that there is in driving-wheels, or in driver brakes on all your trains every day, or say five days in a week, for the sake of having a reserve for a possible emergency that may occur on the sixth day? The braking power contained in the driver brakes represents quite a proportion of the total braking power of the train, and it seems to me that it would be better economy to use it continuously, in connection with the train and everything, in order to get the benefit of it every day at every stop that you make, than to reserve it for a possible emergency.

Union Terminals at Portland, Oregon.

The agreement arrived at by representatives of the various railroad companies comprised in the Northern Pacific Terminal Co., in regard to a union passenger depot and other terminal facilities for Portland, has been ratified by the directors of the companies. Plans for a union depot, train shed, freight houses and other buildings have been submitted and virtually approved, the completion of which will involve the outlay of about a million dollars. It now only remains for the companies to authorize the sale of the necessary bonds of the Terminal Company, when work will at once be commenced.

It is agreed that the Union Pacific, Northern Pacific and Southern Pacific shall unite in using the grounds of the Terminal Company for passenger and freight business, the Terminal Company to fill Couch lake and provide the necessary union depot, trackage, freight houses, etc., as soon as possible. Plans and articles for the necessary changes to accommodate the Southern Pacific have already been prepared by Mr. J. A. Johnston, Acting Manager of the Terminal Company.

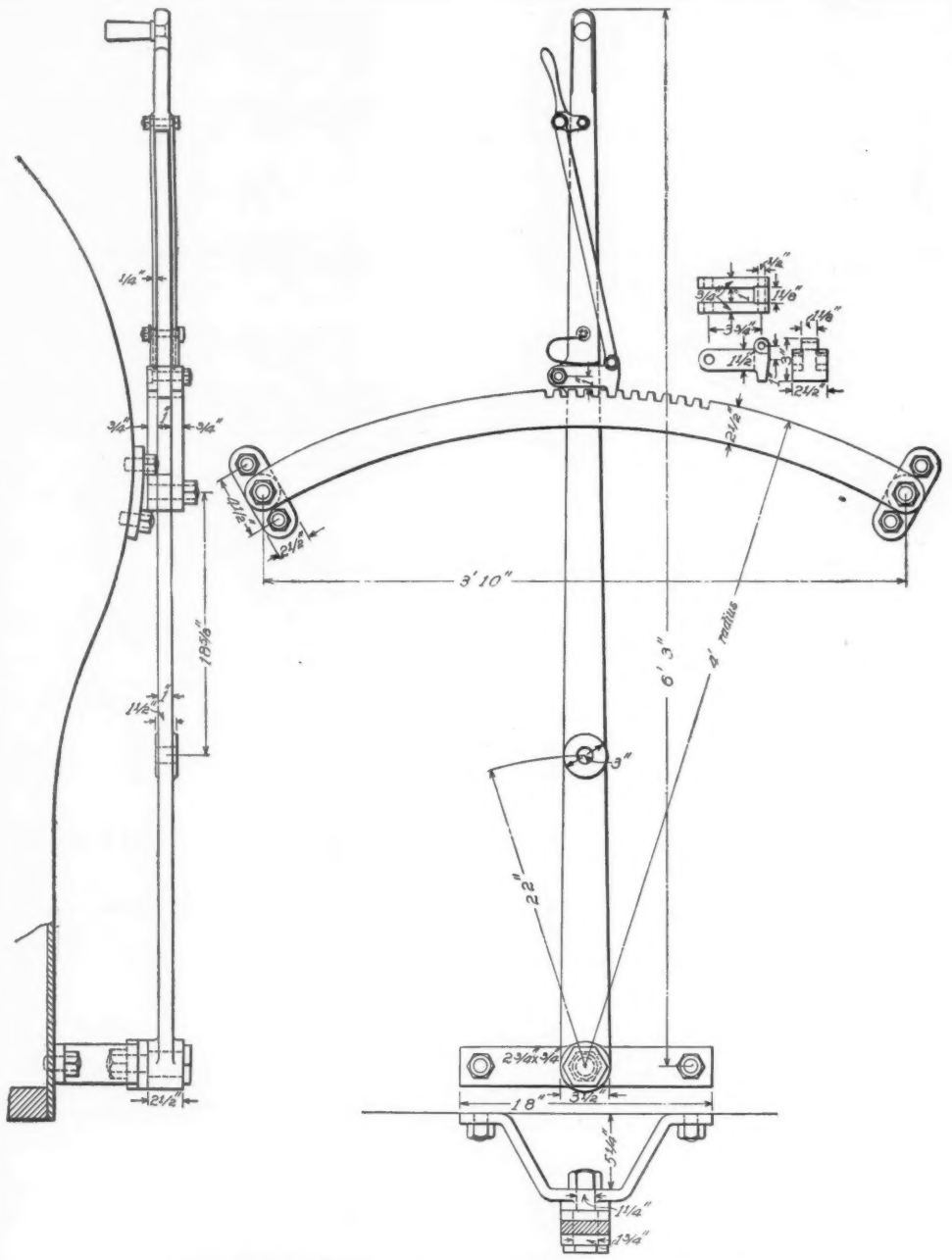
The grounds of the company comprise, including purchases lately made, a little over 40 acres, all in one body. The grounds will contain separate systems of tracks for each of the companies by which the freight business of each company can be done through its own freight house, also a general system of six tracks for passenger business, also team tracks, storage tracks, coal tracks and tracks for car cleaning and other business connected with such grounds, the whole comprising 18 miles of track, and forming a very complete terminal system.

The Union passenger depot will, it is said, be the finest west of Chicago, and will contain a main waiting room, 60 × 100 ft., open up to the roof; baggage room, 60 × 80; three express rooms, each 25 × 30; emigrants' waiting room, 24 × 70; lunch room, 24 × 45; dining room, 30 × 65; ticket office, 21 × 23; kitchen, barber shop, telegraph office, smoking room, toilets, etc. The upper stories will be used for offices, etc. The building will be lighted by electricity and heated by steam throughout. It will have a stone foundation on a sub-foundation of piling, cut off below the water line. At the rear of the depot, about 25 ft. distant, will be a train shed, 102 × 600 ft., connected with the depot by covered platforms and passages, and six tracks, two for each company. Two additional freight sheds, 48 × 800 ft., will be provided. The space between them, 200 ft. in width, will be occupied by 15 tracks, comprising three miles.

The Terminal Company asks bids at once for 800,000 cubic yards of filling.

Reverse Lever—Cumberland & Pennsylvania Railroad.

The reverse lever shown herewith is used on the "Class H" consolidation engines of the Cumberland & Pennsylvania Railroad. It has a new form of latch, which is said to be cheaper and easier to keep in repair than the common form used on such levers. It has been running about one year on the Cumberland & Pennsylvania, and has given much satisfaction. It will be noticed that the quadrants are made ¾ of an inch thick, and the dog which fits into the teeth of the quadrant works on a swivel pin and is kept in position by a simple spring attached to the lever. A detail of the dog, which is a novelty of the device, is also given. We are indebted to Mr. L. S. Randolph, Master of Machinery of the Cumberland & Pennsylvania Railroad, for the drawings.



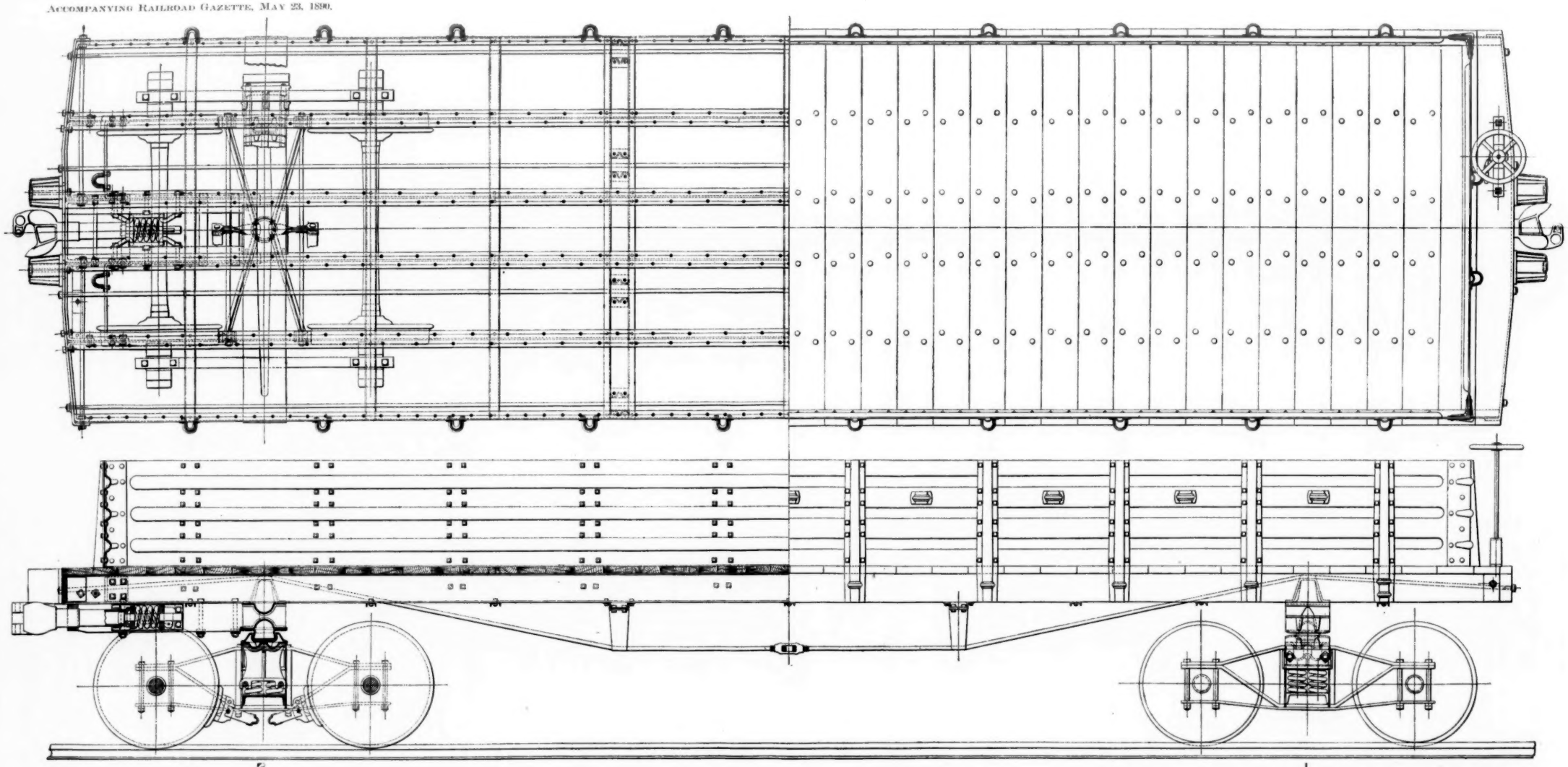
REVERSE LEVER—CUMBERLAND & PENNSYLVANIA RAILROAD.

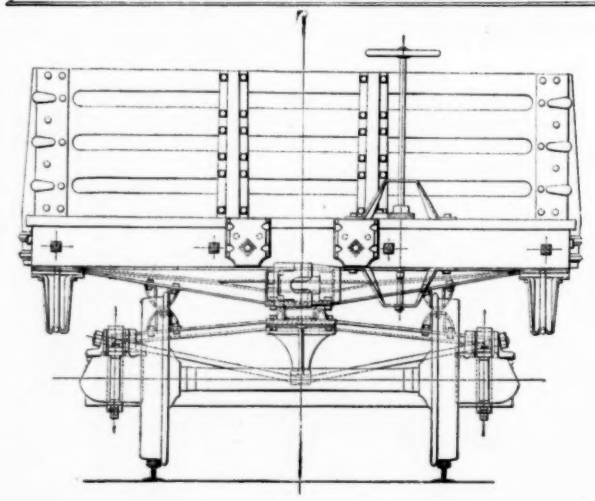
The Kansas City Freight Station of the Kansas City, Fort Scott & Memphis.

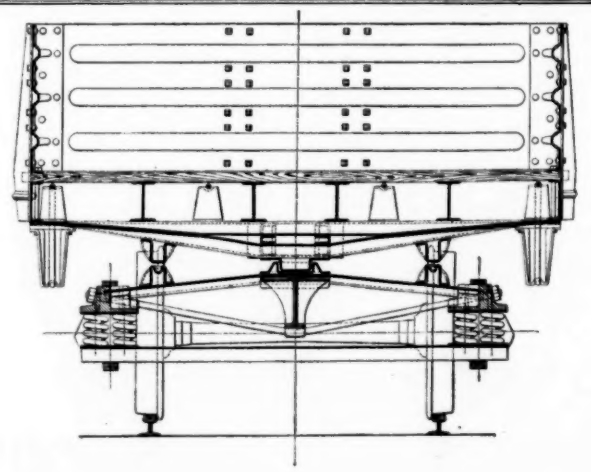
Mr. E. F. Edgecomb, agent at the above station, has sent to the *Station Agent* a description of his ways of working, from which we condense the following facts:

The yards have a capacity of 1,200 cars. To facilitate switching, square red, white and blue, round red, white and blue, and other forms of cards are used, so that very little reading has to be done by the yard switchmen. No memorandum way-bills are used. On the arrival of a train (with regular way-bills) the expense bills are drawn off, and their amounts are at once entered in a "Distribution of expense bill book," in which are columns for the 10 or more connecting roads, and one for city freight. This book is balanced every day with the freight received book. Consignees of carload and perishable freight are notified by telephone and others by postal cards. To prevent errors in outward freight, a list is made every night showing all cars received from connecting roads or loaded at freight houses, with the number of the train on which they were sent out. These lists, when completed, are filed by the tracing clerk.

As soon as the day's billing is completed the revision clerk for outbound business comes on duty, revises the billing, carefully comparing tissue way bill books with the dray ticket in every particular, with an eagle eye on the back charges, prepaid, destination, omission of shipper's order, notify, etc. "We have found that this prompt and careful revision of outbound billing saves us from disgrace many a time and at once informs us which one of our bill clerks is careless." The same plan has been adopted in checking expense bills back with the original way bill to make sure that there is no omission in the wording before letting them out. It is not necessary as to the revenue on same, as the daily balance will keep that straight. Freight to and from connecting lines is checked jointly by a representative of each road, and over, short and damage notations are made on the face of the receipt by joint agreement of the two clerks. "When a platform car reaches a foreign platform, we are telephoned for a check clerk, and one is immediately sent. We follow the same plan when private parties are loading a car of package freight for us at any place in the city, so that we are enabled to do away with that much complained of notation on bills of lading—shippers' load and count." The cards of transfer cars received are immediately







THE SCHOEN PRESSED STEEL CAR.

DESIGNED BY MR. C. T. SCHOEN, PRESIDENT SCHOEN MFG. CO., PHILADELPHIA, PA.

removed and, after being marked with the hour and date of arrival, are filed. Way-bills are of various colors—light green, for perishable freight; light red, time freight; light yellow, ordinary freight.

Inquiries from consignees and shippers by telephone are very numerous, and a book showing movements of all cars of bulk freight is kept close to the telephone, so that information can always be promptly given. Outbound and inbound cars are entered in separate books. Car numbers ending in each figure are placed by themselves. For instance, cars 1,929, 14,599 and 729 would all be entered on the same page under "9."

Mr. Edgecomb describes the ideal organization, in part as follows:

A chief clerk should have charge of all the departments except the cashier and foreman, and any order issued to these departments should go through him. The way-bill, the car, the expense-bill, the trace and claim departments must all have a head such as the chief way-bill clerk, the chief claim clerk, etc., who must handle and be responsible for all the men in their respective departments, lay out the work for them and direct them in its execution. Better work can be secured by placing one man as chief of his department as a man with a title, although it be only a small one, feels the responsibilty and his work brings him in contact with his men more than the chief clerk or an agent possibly could. He at once learns his men and in order to save himself from disgrace or reproach will make known to chief clerk any irregularity arising in his department brought about by the men under him.

Breakages of M. C. B. Couplers.

We have just received the following record of breakages of M. C. B. couplers on the Chicago, Burlington & Quincy, for the first three months of 1890. We shall probably have more to say on the matter next week.

"You will note we have thirty broken drawbars, detailed as follows:

Janney	25
Gould	3
Dowling	1
Hinson	1
Total	30

"The last six months of '89 we had 19 breakages of drawbars. In knuckles we have 74 turned in:

Janney	Iron	37
	Steel	19
	Worn out	12
Gould		3
Hinson		3
Total		74

"The last six months of 1889 we had 30 defective knuckles.

"It will hardly do to tabulate these figures on the basis of cars equipped by the C, B. & Q. R. R. The number of broken steel knuckles, Gould and Hinson, shows that quite a proportion of the breakages are from foreign cars, as we do not yet use this class of material. The appearance of the returns moreover indicates that our men had been going over their scrap piles and that some of the present records should have been in the records of the last six months of 1889. For the next quarter we hope to have a report of the equipment the breakages are removed from."

European Railroad Notes.

In Italy, in 1889, 29.1 miles of new railroad were opened, which is a good deal for that poor country.

During the year 1889, 607 miles of new railroad were opened in the German Empire, of which only 113 miles were to be worked by corporations, all the rest by governments.

There is a rail-mill combination in Europe, by which the supply of certain parts of the country is assigned to certain mills. The Northwestern Railroad of Austria, when asking for bids for its consumption in 1890, was referred to the Prague Iron Manufacturing Co. This company demanded prices from 10 to 15 per cent. per ton higher than the railroad had been paying; the railroad management declined to contract on those terms, and applied to the Austrian mills, and succeeded in placing its order elsewhere. This railroad seems to have found the Thomas rails, which it has used heretofore, unsatisfactory, for one of the conditions required this year was that the guarantee should be for a longer period than three years, which was the limit with previous supplies, or that the rails be subjected to special tests. The contract actually made excludes Thomas rails.

At a recent meeting of the Berlin Railroad Club there was a discussion concerning a reported falling off in the quality of the steel rails manufactured in recent years A Cologne engineer, who has records of the service of rails from a great many German mills from 1870 to date, on an important system, could find no basis for such a report. The proportions of rails replaced for failure of any kind has been very much less recently than in former years, as has also been the proportion of those rejected on inspection and not accepted. As to wear, the amount is so very small and so difficult to measure exactly, when the rails have been but a few years in service, that it was impossible to say whether there was any difference in this respect between the old rails and the newer ones.

The Russian Minister of Finance has recently made a report on the rates of the Russian railroads, a subject which was entrusted to his department in November, 1888, as representative of the public interests. In the following March, for the fulfilment of this charge, there were established, subject to the ministry, a "Railroad Council," a "Rate Commission," and a "Railroad Department," in the last of which were concentrated all railroad matters in which the ministry has authority. The chief purpose aimed at, the minister says, was to introduce order, clearness and a rational basis for railroad rates. Rules of universal application were established to prevent the railroads from making arbitrary rates, which they had done previously, solely following their private interests, which often were not in harmony with those of the public. At the same time progress was made in the development of the rates themselves. Special attention was given to the rates on grain, which are of as much importance in Russia as in Nebraska, for instance. With the co-operation of representatives of the farmers and the railroads, the principles of a system of grain rates—for export, domestic, through and local shipments—were established, and the rates based on these principles extended the markets of all the producing districts, and for most places, especially for those which are distant from the great exporting markets, the new rates were lower than the old ones. Aside from this, special reduced tariffs were made for flour intended for export, and for mill-stuffs within the country, for the purpose of encouraging the milling industry and stock-growers. These changes, the minister affirms, have been, on the whole, an important improvement; though he acknowledges that in so complicated a matter there have been many mistakes, and that much remains to be done. "Now, the rates really form a system based on recognized economic and financial principles, while formerly they were a chaos, caused by the competition of the different roads to attract traffic, the cost of which was mostly paid by the state," which guarantees dividends on nearly all the railroads.

The same authority has, since this report, issued regulations for the purpose of *preventing* competition among the railroads. According to these regulations, where there is traffic for which different railroad lines compete, either the rates must be made the same by all the competing lines, or the traffic, or the earnings from the traffic, must be divided among them in proportions according to the circumstances in each case; that is, the Russian minister, on behalf of the public, *compels* the railroads to pool where they compete. A meeting of representatives of the railroads will confer with the minister as to the application of these regulations.

TECHNICAL.

Manufacturing and Business.

Esek Cowen, Edward N. Dickerson, De Lancy Nicoll and Edwin H. Brown have formed a partnership for the general practice of law, under the firm name of Cowen, Dickerson, Nicoll & Brown, with offices to be located in Wilks Building, 15 Wall street, New York City. Messrs. Cowen & Nicoll have charge of the general state and federal practice, and Messrs. Dickerson and Brown of patent litigation.

Heavy machinery is being put in the new Philadelphia Brass & Copper Rolling Mills of Bailey & Story, at Olney Station, in the Twenty-second Ward, Philadelphia, on the Philadelphia & Newton road. The firm has purchased four acres of ground, upon which a building 150 × 120 ft., with a wing 50 ft. long, has been so far erected. It will be ready for operation in a few weeks. The office is on South Fourth street, Philadelphia.

Among recent orders for the Goldie spike is one for 1,000 kegs for the Wyoming Improvement Co. for the Pacific Short Line.

The Elmore journal box lid will be used on 300 fruit cars which are now being built for the Union Pacific.

The Memphis Equipment Co., having a capital of $1,000,000, has been incorporated by Nathaniel Thayer, of Boston; George H. Nettleton, of Kansas City, and others, to build cars upon the car trust plan for the Kansas City, Fort Scott & Memphis road.

Iron and Steel.

The Moorhead-McCleane Co., of Pittsburgh, has its new 96-in. plate mill in successful operation on large contracts.

Work has been commenced on the erection of the new machine shops of the Oliver Iron & Steel Co., of Pittsburgh, which were destroyed by fire last year.

The Edgar Thomson Steel Works, of Pittsburgh, are erecting a new boiler house, which will contain 17 improved boilers in addition to the 60 now in use.

The Henderson Steel Co., of Birmingham, Ala., has, it is stated, decided to duplicate the present plant, which has a capacity of 30 tons per day. The new plant will be completed in about three months.

The new plant of the Greensburg Steel Co., at Greensburg, Pa., has been put in operation. The firm will manufacture tool steel of the best quality.

The Ontario Rolling Mills Co. and the Dominion Bolt Co., of Hamilton, Ont., have secured the order for the fish-plates, spikes and bolts for the new Westminster Southern road from Brownsville, B. C., to the intercolonial boundary from Nelson Bennett, President of the road. The material amounts to about 250 tons, and is to be delivered by June 1. Two special trains will convey it to the coast.

The Rail Market.

Steel Rails.—Eastern quotations are normally $31@31.50; Chicago mills quote $35, and Pittsburgh mills $31@$32.

Old Rails.—Quotations at New York are $23, at Pittsburgh $23.50@$24 for old iron rails, and at Chicago $21 for old steel rails

New Shops.

The contract for building the Tacoma shops of the Northern Pacific has been let to A. McMullen & Co., of Minneapolis.

The contract has been let for the machine shops at Vicksburg, Miss., of the Louisville, New Orleans & Texas. The buildings will cost $75,000.

The West Virginia Central & Pittsburgh is erecting at Elkins, W. Va., a blacksmith shop 20 × 40 ft., and a machine shop 40 × 100 ft.

A site has been selected for the new malleable iron foundry of the Laconia Car Co. It will be erected near the paint shop, and will be 156 × 40 ft. The company is also building a large addition, 125 × 15 ft., to the old foundry. In connection with the new foundry a large chimney, 110 ft. high, 12 ft. square at the base and 5 ft. 9 in. at the cap, will be built.

Proposals for Filling.

The Northern Pacific Terminal Co., of Oregon, asks proposals for about 800,000 cubic yards of filling on its property in Portland, Or. Fifty thousand yards of this must be done immediately, and the remainder at the rate of 50,000 cubic yards per month. The material may be dredged from the bed of the Willamette River or procured otherwise. Proposals should be received by Mr. J. A. Johnston, Acting Manager, Ainsworth Building, Portland, Or., before June 16.

The Lindner Starting Valve.

The Lindner Starting Valve apparatus for compound locomotives has been placed in the hands of Capt. Charles Fairholme, of London, No. 18 St. Dunstan's Hall, E. C., England, who has been appointed Agent for England, the Colonies, the United States, and European countries. To him all inquiries should be addressed.

A Novelty in Electric Railroads.

Mr. A. Davis, formerly of the North Shore Railway, has completed plans for an elevated electric railroad for Montreal, and has secured patents for the inventions which are the distinguishing features of the system. The track is elevated on a series of single posts, 60 ft. apart. Single girders, resting on these pillars and sunk six inches into their heads, carry the rails. A distinctive feature of the system is the provision for supplying the motive power to the cars. The cable for conveying the electricity runs along the top chord of the girder. The cross-ties, instead of being fastened to the top of the girder, are passed through the lattice work, so that the upper portion of the girder projects to within an inch of the bottom of the cars. The motor is fastened under the centre of the car, and the electricity is conveyed to it by two wheels, which grip the cable and can be regulated from the interior of the car. By this arrangement the necessity of making the electric motor draw its supply of energy through the wheels or axles of the car is avoided, and the car does not depend for propulsion on the adhesion of its wheels to the tracks. The wheels are also completely free from brake friction, as the brake system consists of a pair of shoes adjusted so as to grip the top chord of the girder on either side. The motor can be made to work direct by steam propelled cable, or by electricity.

Esquimalt Graving Dock.

Eight tenders were submitted for completing the government graving dock at Esquimalt, B. C. Tenders ranged from $338,945 to $540,454, the lowest being that of Starrs & O'Hanly, of Ottawa. This bid was withdrawn, as a clerical error of $25,000 was made. The contract was awarded to Larkin, Connolly & Co., the next lowest contractors, at $374,559.

Underbilling in Canada.

At a meeting of the Montreal Corn Exchange last week letters were read from Traffic Managers Olds, of the Canadian Pacific, and Seargeant, of the Grand Trunk, saying that, owing to complaints received from honest grain shippers in Ontario, and the undoubted fact that frequent and extensive frauds have been practised upon the roads by shippers under-billing weights, they would refuse to accept any more grain in bulk for track delivery. Hereafter all grain will be sent through the company's elevators. A great many shippers have been in the habit of returning weights of from 25 to 33 per cent. less than the actual amount loaded in the cars. Mr. Seargeant added: "It has been represented to us that this practice, unless checked, will prevent honest traders carrying on their operations. It is obvious that, if considerable quantities of traffic are hauled for nothing under fraudulent declarations, those who resort to the practice have a material advantage in effecting sales over their competitors. Under the Interstate Commerce law of the United States persons so under-billing are liable to a fine of $5,000, and in addition two years' imprisonment in the penitentiary. In the past the railroads accepted the bills of lading on the shippers' assurances, but have lately been finding that there have been serious discrepancies. Soon after the arrangement for placing all grain in the companies' elevators within 24 hours after its arrival went into force it was found that there was a great discrepancy between the bills of lading and the freight. Every car load of grain placed in the elevators was weighed on being discharged, and it was found that cars specified in the bills of lading as containing 200 bushels actually contained 400. The under-billing was found to be so general that the roads concluded to quietly continue to gather information, with the result above stated." The two companies estimate their loss, it is said, at as much as $20,000 a month this spring.

Air Brakes on Freight Cars.

The Westinghouse Air Brake Company now has orders in advance for 25,000 sets of brakes. Both the works in Allegheny and at Wilmerding are running. At Wilmerding 2,400 molds a day are cast. Of these 25,000 air brakes 1,000 are for the Baltimore & Ohio. Another thousand are for the Soo line, and the Chicago, Milwaukee & St. Paul has a large order. One thousand more are being manufactured for the Indianapolis Car Company, and are to be used on coal cars for the Choctaw Railway & Mining Company in the Indian Territory.

The Chili-Alaska Limited Express.

We are glad to see that the daily press takes broad and comprehensive views of railroad problems, as evidenced by the following wise editorial from the Norwich *Bulletin*:

"It is not beyond the reach of probability that men now of mature years will live to see a railroad running at least as far North as Sitka. When that time comes, if the Southern line shall have been opened, it will be possible for the traveler to journey himself or send his goods, without change of car, from Santiago to Sitka, or to any intervening point."

An Underground Cable Road in Glasgow.

A select committee of the House of Lords has passed the preamble of the Glasgow Subway bill, which authorizes raising nearly $4,000,000 to build a subway about six miles long, to be operated by a system of wire rope haulage. The speed expected is 12 to 15 miles per hour, with four per cent. as the maximum grade where the subway passes under the Clyde. At some points the road will be 110 ft. under the ground and at others only six feet.

RAILROAD GAZETTE

Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The virtual absorption of the St. Louis & San Francisco by the Atchison, seems to be an accomplished fact. It was bound to come sooner or later. The Atlantic & Pacific, which formed the connecting link between different parts of the Atchison system, was controlled jointly with the St. Louis & San Francisco. As long as the transcontinental business was of trifling importance, such joint control made no trouble; but with each year the necessity for making some different arrangement became more apparent. The method just adopted is probably the simplest way out of the matter. It is not likely that we shall see any change in railroad policy as a result of this consolidation. The territory of the St. Louis & San Francisco is so far distinct from that of the Atchison that they will probably deal with their separate problems in the future very much as they have done in the past. But the size of the combined systems will be worth looking at, even in these days of large things. The Atchison system includes 6,600 miles, the St. Louis & San Francisco, 1400; the roads previously operated jointly by the two systems about 1,100, making a total of over 9,000 miles. If we add various other lines which might be counted, we get a figure of mileage nearly equal to that of the combined Wabash-Missouri Pacific in its best days, and superior to that of any other American system which has its ownership equally centralized. In fact the Prussian Government is the only railroad owner in the world which can surpass the new Atchison system in mileage operated. Another matter of much consequence in Atchison matters is the apparent failure to establish the voting trust. We say *apparent* failure for we are informed that there is a powerful element still at work which may yet effect the trust.

The twenty-first meeting of the American Society of Mechanical Engineers, held last week in Cincinnati, was in some respects an unusual one, not so much because of the value of the papers presented, as for the reason that some new departures in management and in ruling at the session were observable. Also a decided step was taken in the direction of giving more attention to strictly railroad work. The railroad element of the Society is increasing rapidly in numbers, and some of the latest from this field to join are men of wide experience, accustomed to speaking, and who have convictions. These men have been stirred to greater activity by recent developments in the direction of more scientific railroading, and their efforts have led to the appointment of a committee to formulate a standard method of testing locomotives. Previous to this time the Society has not paid to railroad work the attention which it deserves, and the appointment of this committee is a step which, if its purpose be well carried out, will result in much advantage to the railroads and to the society, both at home and abroad. The committee consists of seven members, several of whom have had considerable experience in designing and testing locomotives. There are other fields of investigation in railroad work into which it would be extremely advantageous to send well-informed committees to make recommendations and to outline future work, in order that such steps may be taken in a scientific and logical manner, and it is highly probable that one or two other committees for railroad work will be appointed at the next annual meeting. Probably one reason why so little attention has been paid by the Society to railroad matters in the past is a feeling which has existed that the strictly railroad associations contain talent enough to cope with any subject needing attention, and it cannot be denied that the Master Mechanics' Association ought long since to have taken up and recommended the standards for which the committee has been appointed, as they are of vital importance to railroads which desire to learn by comparison the relative value of their own and other locomotive equipment.

When the resolution was passed in the American Society of Mechanical Engineers to appoint a committee on locomotive tests, there was developed a difference of opinion as to the policy of increasing the number of committees. The President, on rising to appoint the committee, said that it was desirable to keep the number of committees as small as possible so as not to impose too much work on the society, but that he supposed that this committee should be appointed. A different opinion regarding the appointment of committees is held by many of the members. It is believed by them that the limit to the number of committees is only to be found in a lack of members who are willing to serve faithfully; and further, the burden on the society is now exceedingly small, owing to the small number of committees and the small percentage of the membership so engaged. If it is found that the work imposed on the members of the committee is too great, then it might be well to increase the number of appointments on each, and thus reduce the labor of each, as in the case of the committee on standard locomotive tests.

At the last meeting of the Mechanical Engineers objection was raised by some careful members of the Society to the introduction of so many mathematical discussions as were presented at the last meeting. This objection is not a very good one, because to the scientific engineer nothing is more useful as a backbone to which to attach the results of experience than a good mathematical analysis. If the percentage of mathematical papers is too high the best thing to do is to increase the number of what are called practical papers, and none are better prepared to present such papers than the practical men who object to the mathematical papers, and with them lies the remedy, if any be needed. With regard to the selection of the papers it may be that the Publication Committee needs a little encouragement from the members to reject those not pertinent, accurate or satisfactory. Perhaps a little more attention should be paid to the selection of papers. If this should result in decreasing the number of papers and in improving the quality of those which remain, the society would undoubtedly be benefited. As it was at the last meeting the members could but notice that the greatest anxiety of the Chair seemed to be to keep up with the schedule time, regardless of the desirability of continued discussion. An important paper was as anxiously pushed as an unimportant one, and the topical queries were driven through at high speed. No doubt this was necessary to keep up with the time table, but it might be asked if fewer and better prepared papers, carefully overlooked by the Publication Committee and thoroughly well discussed, would not be more creditable to the Society than a larger number of subjects hurriedly treated.

The Efficiency of Locomotives.

In the paper on the above subject, presented at the Cincinnati meeting of the Mechanical Engineers, were numerous errors, some of which were brought out in the discussion. Among these errors is the following: "It is, therefore, no exaggeration to say, in 1890, as Mr. Clark did in 1852, that with a well designed link motion of liberal proportion the objections of wire drawing are of no practical weight." The fallacy of this appears on the face of all recent design of high-speed locomotives where is clearly seen a careful endeavor to avoid wire drawing, with only indifferent success, as any one familiar with high-speed locomotive indicator cards well knows.

It was also said that "the reduction of indicator card area, caused by early exhaust closure and the large clearance spaces found in locomotive cylinders, is often over-estimated." Then followed an estimate showing that the mean effective pressure is greater when the clearance is reduced, the compression being raised to the same point in each case, thus showing an advantage in favor of a reduced clearance, in increasing the power of the locomotive, as well as its theoretical economy. It is difficult to harmonize these and other statements. For instance, the writer of the paper said: "If compression takes place suddenly, as is the case in cylinders having very small clearances, the heat does not have time to become equalized between the steam and the cylinder wall, and the power required for compression will be in excess of that necessary where the action takes place more gradually. . . . From the foregoing the writer has been led to the conclusion that, although the clearance spaces in locomotive cylinders are usually larger than desirable, there is a limit pretty sharply defined below which it is prejudicial to go in reducing them, provided the link motion is retained."

The limit mentioned is not shown to exist, because the writer has illustrated by his calculation that both the power and the efficiency of the engine are increased by reduction of the clearance from 10 per cent. to 2 per cent. of the cylinder capacity. If the limit be wholly confined to the suddenness with which the compression takes place in the case of small clearance, and is dependent upon the lack of time for the heat to "become equalized between the steam and the cylinder wall," then, as in the first case, the limit does not appear, because for economical operation it is better that the walls of the clearance spaces be heated by the incoming steam rather than by heat which is obtained from the mechanical work stored in the moving parts of the engine and given out to the compressed steam during the time of compression. A most desirable condition of steam engine operation would be one in which no heat was extracted from the steam during compression, which condition is stated by the writer to exist, as noticeable in the foregoing quotation, when the compression takes place suddenly.

In the calculation an obvious error appears. It is assumed that 54 lbs. terminal pressure is all that is required to arrest the motion of the reciprocating parts of a steam engine, regardless of the clearance. The figure of 54 lbs. of terminal pressure is, of course, only assumed, and with that no fault is to be found; but it is not the mere terminal pressure which arrests the reciprocating parts, but the work performed on the compressed steam from the time compression commences to the point when compression ceases. With the same final pressure of compression the work done, which acts to arrest the reciprocating parts, is vastly different in the two cases cited, being about four times greater, according to a diagram furnished with the paper, in the case of the 10 per cent. clearance than with the two per cent. clearance. In order that the same arresting effect shall be obtained the work performed ought to be the same in both cases; hence, on a fair basis of comparison the terminal pressure in the case of the two per cent. clearance ought to be considerably more than the 54 lbs. assumed for the 10 per cent. clearance. In that case a measurement of the diagrams furnished would show a mean effective pressure much larger in the case of the greater clearance. If now these mean effective pressures be compared with the amount of steam used per stroke in the case of the two mentioned amounts of clearance, it will be found that with the smaller of the two the greatest mean effective pressure per pound of steam used is obtained.

This question of clearance in locomotive cylinders deserves attention, and indirectly the writer of the paper has benefitted the society by calling attention to it; but in its consideration there are many points to be noticed, other than those mentioned in the paper, and unless attention is called thereto a wrong impression would be obtained by readers who are not well informed in all the details of the effect of clearance spaces in locomotive cylinders, which vary greatly in different designs, that is, from 5 to 20 per cent., manifestly with detrimental effect in the case of the larger amount.

We are now entering upon a period of extended series of experiments with and practical trials of compound locomotives. Many of these machines will be built with what may be termed a "super heater" in the smoke box. This results from the location of the receiver between the two cylinders at that point. While the economy which may be expected therefrom is not large, yet no one, in the light of our knowledge of the heat wasted in the gases passing through the locomotive smoke boxes, will dispute the advantages of saving this heat. Therefore, it may be well when reading the statements made in the paper here mentioned, with regard to the superheating of boiler steam, to bear in mind that the superheating there referred to is of a degree far greater than may be expected in the case of the compound locomotive. A reasonable degree of

superheating is advantageous in locomotives or any other type of engine and boiler, and can be had without the difficulties which are mentioned in the paper.

The following sentences ought to be taken with a great deal of caution: "When engines with well protected cylinders are running at high speed it is hard to understand how cylinder condensation can take place to any hurtful extent. The writer has examined a large number of indicator cards taken from locomotives at speeds ranging from 40 to 65 miles per hour, but has been unable to detect any trace of either condensation or re-evaporation. At slow speeds, however, the benefit of compounding is beyond dispute, as witness the success of the system, both in marine and stationary work."

Now, with regard to these statements, it may be well to remark that in stationary engines an increase of speed above the normal, which of course is a little indefinite, has not shown a decrease in condensation. Extended experiments carefully made at the Massachusetts Institute of Technology have shown no increase of economy due simply to increased speed when the number of revolutions per minute of high speed engines was increased as much as 50 per cent. Also, it is impossible to conjecture the course of reasoning which has led the author of the paper to suppose that cylinder condensation could be discovered on a locomotive indicator card at speeds of from 40 to 65 miles per hour, when it is known that on such cards it is simply impossible to determine satisfactorily the point of cut-off, and in which the leakage of the valve often amounts to as much as might be expected, in increase of terminal pressure from re-evaporation; and in which, like other steam engines, the condensation tending to reduce the terminal pressure might be counteracted by the re-evaporation. What is meant by slow speed is not stated. If piston speed, which is generally used as a basis of comparison, is intended, then it is well to remember that compounding in marine engine service is found to be highly advantageous at piston speeds equal to or exceeding those attained on locomotives in express service.

Several times during the past year we have called attention to the possible advantages to be obtained with locomotives under many of the conditions of ordinary working by a reasonable wire-drawing of the steam at the throttle, and have cited instances where experiments have shown economy to result therefrom. It is not uncommon to find conditions in ordinary stationary practice where wire-drawing at the throttle is advantageous in reducing losses resulting from a high water line, a tendency to prime, or contracted steam space in boilers. This is in strong contrast with the statement in the paper to the effect that much of the economy to be expected from compound locomotives is obtained because such locomotive *must* be worked expansively. The fact is, that our locomotive engines have to be worked expansively, as they are without compounding, or the steam could not be got out of the cylinders when running at any considerable speed. The common notch in ordinary locomotives, used at high speeds, is the 6-inch, which gives a theoretical expansion about four times. Indicator cards from most of the compound locomotives thus far tested show an expansion varying from 4 to 4½ times. Therefore, the forced expansion in the case of the compound locomotive does not appear on the face of our present experience. But it must be admitted that while not compulsory yet greater expansion is possible in case of the compound.

The paper is not wholly bad, and some of the statements therein are worthy of promulgation. One of the best is the following, to which attention is called as being suggestive of one of the lines on which we may look for progress, and as being an expression of a well established and insufficiently appreciated fact regarding the necessary weight on locomotive drivers to haul trains at high speed:

> It may safely be stated that no locomotive built during the last 20 years has been deficient in adhesive weight after once getting its train well in motion, notwithstanding the slight and unreliable evidence adduced to the contrary. In other words, the mean effective pressure in the cylinders when running at all fast is quite insufficient to cause the tractive force to exceed the adhesion. A feature of any substantial change in locomotive design will then probably be a method of increasing the coefficient of adhesion at starting, for although many devices tending to this end have been experimented with, we still, in default of something better, have to rely on mere dead weight, a large proportion of which is useless at other times, to get the trains away from the stations.

Passenger Fares in Austria.

The Austrian government has followed the example of Hungary in establishing a "zone" tariff; that is, a system of group rates for passengers. In its details, the Austrian system differs a good deal from the Hungarian. The Hungarian had very low mileage rates for the short and long distance journeys, but charged proportionately more for middle distances. The Austrian rates are treated on the same mileage basis for different distances. The unit for third-class accommodation trains is one kreutzer per kilometre, or about two-thirds of a cent a mile. The first zone covers a distance of ten kilometres, or six miles, so that the smallest fare actually paid is four cents. For each additional six miles, up to thirty, four cents more is charged. The next two zones are nine miles in width, involving in each case six cents addition to the fare. The next zone covers twelve miles, with eight cents charge; each additional zone covers thirty miles, with twenty cents extra charge.

The fare for second class is twice that for third, and that for first class three times the third. On express trains, fifty per cent. is added to all fares. The results of the two extremes may be presented in tabular form as follows:

	3d class accommodation.	1st class express.
Less than 6 miles	4 cents	18 cents.
6 to 12 miles	8 "	36 "
12 " 18 "	12 "	54 "
18 " 24 "	16 "	72 "
24 " 30 "	20 "	90 "
30 " 39 "	26 "	117 "
39 " 48 "	32 "	144 "
48 " 60 "	40 "	180 "
60 " 90 "	60 "	270 "
90 " 120 "	80 "	360 "
120 " 150 "	100 "	450 "

and so on indefinitely.

In addition to these fares, there is a moderate charge for all baggage, 55 pounds of which had hitherto been carried free. Return tickets have been abolished: also commutation, except for very long periods.

The average reduction in fares as compared with the present system is very great. On first and second class express it averages about 20 per cent.; but the extra baggage rates will render about half of this apparent benefit illusory. On third class express and first and second class accommodation it runs from 30 to 40 per cent.; on third class accommodation, which includes the bulk of the travel, from 40 to 50 per cent.

The adoption of this system in Austria indicates that its operation in Hungary is at least fairly successful. As we explained in an article printed May 9 (page 318), it is too early to judge how complete that success has been. It has decidedly increased the gross earnings of the Hungarian roads, the number of passenger journeys having more than doubled; but it is pretty certain that their operating expenses have increased, and it is impossible to say whether the latter result may not have far outweighed the former.

Even if the Hungarian system has succeeded, it does not prove that the result will be the same in Austria. The Hungarian tariff, though apparently very arbitrary, was really to a great extent based upon what the traffic will bear. It charged low rates for very short distances, and low rates for very long distances; the journeys of moderate length paid proportionally more. This is about what is done in the United States in thickly settled districts. So much of the short distance traffic is done by commuters that the charges for this average very low. Our long-distance traffic gets the benefit of competitive rates on limited tickets. It is the middle distance travel, too long for commutation and too short for competition, which pays more. What Hungary does is to give all short-distance passengers the same rates which are allowed commuters. Austria extends this policy to middle distances also. The loss of revenue from the latter may be very much greater than from the former, because there is no certainty that business will develop enough to compensate for the reduced fares.

Whether the experiment succeeds or fails, it will offer some ground for criticism of the government. If a country is thickly enough settled to give paying train loads at two-thirds of a cent a mile it is discreditable to have kept fares for so many years at twice that figure. If, on the other hand, the experiment does not pay, it seems wrong to have made it on so extensive a scale all at once. It is the sort of policy which is best tried in spots. If there is a chance for such trial, the country does not have to wait too long for the inauguration of the policy nor suffer too severely if it proves a failure. But this is precisely the sort of trial which a government railroad is prevented, by political reasons, from making.

Prizes for Trainmen.

In discussing the best methods of disciplining train and station men, and especially of compensation, rewards and punishment, we have often emphasized the difference between rewards and prizes, and the superiority of either a reward or a prize as compared with a punishment. The hope of reward being a motive which it is so much more desirable to cultivate than the fear of punishment, it should be a cardinal principle to fix the rate of wages so that it will always be possible to increase the pay a little in exceptional cases. This truth is plainly illustrated in the system of premiums for fuel economy on locomotives as practiced by the Pennsylvania (west of Pittsburgh) and of track inspection and premiums in vogue on a number of important roads. We think no one will question the statement that, in every instance of this kind, not only the employés, but the officers charged with the administration of discipline, will testify to the great superiority of the results as compared with work done under a system which knows no variation, in compensation or incentive, except in the way of fines, suspension or other punishment.

While commending the giving of premiums to trackmen and enginemen, we have urged the introduction of a similar system in other departments, but without much apparent success. Although the status of train and station men has, as a general thing, improved somewhat during the past few years, the elimination of favoritism, the adoption of more careful and just methods in promotion and the adjustment of wages, being at least visible in spots, any marked difference in this line has been hard to find. The Fall Brook Coal Company pays its freight conductors an annual premium for a perfect record, and there have been small isolated instances of a similar kind elsewhere, but the almost universal fact is that directors will not authorize the additional increase in expenses necessary to introduce even the most limited system of increased pay except where a "brotherhood" or some other organization extorts it, as it were, at the muzzle of a pistol.

But notwithstanding this discouraging state of things, the correctness of the theories referred to is still unquestioned by those who carefully investigate them, and we occasionally find a manager who is able to corroborate them by a concrete example instead of by mere opinions "not for publication." One of these examples is given in this issue, in the shape of an account of a movement on the Seattle, Lake Shore & Eastern which affords a striking evidence of the value of the methods we are speaking of. Messrs. A. S. Dunham, Managing Trustee, and F. W. Dunn, Acting Superintendent, of that road, though located in what seems to Eastern people as a far-off corner, are apparently well versed in the best methods of managing the personnel of a railroad, as exemplified on the best roads of the East, and they have already adopted, although their road is comparatively new, a system of track inspection similar to that of the Pennsylvania, and in addition a system of awards to trainmen, which is quite novel, although Mr. Dunn states that he has thus rewarded trainmen, to a limited extent, in past years on the Chicago & Grand Trunk, Evansville, Terre Haute & Chicago and the Nevada Central. Some notice of this scheme was given in the *Railroad Gazette* of April 25, but as it is worthy of preservation in a more complete form, we reprint herewith the circular as it now appears in the book of rules, just issued. This book of rules has, by the way, a number of other points worthy of imitation by superintendents generally, although we regret to say that it does not conform to the Standard Code in phraseology or arrangement, nor, in some cases, in substance. We trust the managers do not entertain the deceptive idea held by some northwestern railroad men that the Standard Code is "not adapted to their part of the country."

Mr. Dunn, in response to our inquiries, says that he regards a system of premiums as almost indispensable, and that the increase in the number of cars handled by freight trains, in saving of time and other important details effected by the system, often figures up 15 to 50 per cent. The adoption of the system on the Seattle, Lake Shore & Eastern increased the freight train load and decreased overtime to a marked degree in less than two weeks, and he expects to show a positive increase in net earnings.

We print a sample of the report which is filled out in the superintendent's office for each man, the headings of which will explain the manner of using it. There is a line for each day in the month. One blank is filled out for each conductor and one for each engineer, and a prize is paid to one conductor and one engineer each month, the men working with them being correspondingly rewarded, as indicated in the circular. The facsimile of the blank can, of course, show only an outline of the system, as its value depends essentially upon the good judgment and care with which it is administered. We will not criticise the circular or the blank, for the reason that Mr. Dunn states that the system has been adopted somewhat hastily, and that a better blank can doubtless be made.

This superintendent tells us, what several other su-

perintendents have said heretofore, that presidents, directors and other higher officers are often found who will not give sufficient thought to transportation matters to become interested in a valuable idea like this (if it be novel), and that improved methods often languish on this account. This being the case, we shall not speak reproachfully to those superintendents who have read but have not followed the admonitions we have given them on this subject heretofore; but we advise all such readers to post themselves fully concerning Mr. Dunn's system and the results he gets from it, and then make a forcible onslaught upon the men who hold their companies' purses, whether they be presidents, directors or general managers. Subordinate officers who know the needs of the service have a duty to perform in imparting their knowledge to the financial controllers of the company.

The Indianapolis *Journal*, whose railroad department is a specially intelligent one, recently stated that large numbers of railroad men in that region were resigning to better themselves, and that these resignations were from the better class of employés. It cannot be that superintendents will willingly permit such a harmful depletion of their forces, and we must therefore conclude that their views and those of their directors do not agree. A general manager of a large road recently expressed the conviction that American train service, generally, needed a more intelligent class of men. We do not regard this remark as derogatory to the present body of trainmen, for the reason that changed conditions of service and the adoption of complicated (or at least novel) safety appliances has introduced a necessity for improvement which has not been met. The failure of the men to educate themselves up to new standards is as much the fault of the companies as of the men, and the higher intelligence does not necessarily imply a demand for new men. Cultivate the talents of the old ones. But this same general manager finds it difficult to get his directors' minds off the annual and monthly summaries of gross and net earnings, and he actually has to have a collision at a crossing before he can get them to approve an order for interlocking. Such an "environment" as this is discouraging to any officer; but the most hopeful way out of it is to persistently bring to the notice of such directors samples of circulars like that issued by Mr. Dunham. They should especially note the spirit of the last paragraph of that circular.

Electricity on Railroads.

At the Cincinnati meeting of the American Society of Mechanical Engineers was presented a paper on Working Railroads by Electricity, an abstract of which appears in another column. The paper, while it does not reach satisfactory conclusions, or conclusions that might be reached by a more extended treatment of the subject embodying more of the data already obtained from the operation of railroads by electricity, is yet suggestive and provoked much discussion.

It was not shown that sufficiently large motors had been built to prove conclusively the feasibility of such a machine. One member, a railroad man, stated that the only way in which the use of electricity could be brought about for large roads was for such corporations to manufacture their own motors, unless the price was considerably reduced, the charges now being out of all proportion to the actual cost of the machine, and unreasonably large. This is a point well worth considering. The charge is now about $80 per horse power for ordinary sizes of motor. This would make a motor sufficiently large to pull a medium sized train cost about $50,000. However, motors are offered in the market, which seem to be of good design, for $25 per horse power, which is a more reasonable figure.

Two members spoke strongly in favor of sub dividing the power and doing away with a heavy motor at the head of the train when electricity is applied to trunk lines, advocating the use of a motor on each axle, stating that thus there would be a saving in weight and complication as well as the cost of repairs and first cost. It is needless to add that these men were not railroad men and scarcely electricians, because they referred to the electric motor as being "as simple as a grindstone or a coffee-mill." It is of no use to mislead ourselves by the assumption that the whole scheme of propulsion by steam is constructed on a wrong basis, and that electric motors resemble a grindstone or a coffee mill in their simplicity. So far such motors are complicated pieces of mechanism, requiring most careful attendance and perfectly dry surroundings. The proposition to put one of these devices on every axle of a train is ludicrous. The washing of passenger cars would alone render the motors worthless, and the attendance required to keep them in order would be simply appalling. Neither is the theory right, because a train runs better and smoother when pulled than when pushed. It is safer and best that the axles under the cars be not hampered by any driving mechanism. No saving of weight will be obtained, because the horse power which can be given out by a motor per ton of total weight increases as the total weight is increased. In the case of subdivided power the total motor weight will be greater. A large motor is more efficient than a small one; and so on. A whole category of logical reasons could be given for condemning a subdivided system of propulsion. The objections are as largely theoretical as practical.

One false assumption which ought to be corrected was made by the writer of this paper. It appears near the close, where he assumes that the resistance of railroad trains varies as the square of the speed. Undoubtedly the writer was careful to look up some of the published formulæ on the subject, and his statement corresponded exactly to the value of the expression contained in such formulæ. This is a clear illustration, showing how careful one should be in accepting a formula of any sort, except it be in pure mathematics. Especially is this true when the formula is an empirical one based upon results of experiments, however carefully such experiments may have been performed.

April Accidents.

Our record of train accidents in April, given in this number, includes 64 collisions, 67 derailments and 4 other accidents, a total of 135 accidents, in which 15 persons were killed and 140 injured.

These accidents are classified as follows:

COLLISIONS:		
Rear	27	
Butting	24	
Crossing and miscellaneous	13	
		— 64
DERAILMENTS:		
Broken rail	2	
Defective switch	6	
Defective joint	1	
Broken wheel	3	
Broken axle	4	
Broken truck	1	
Fall of brake beam	1	
Misplaced switch	3	
Runaway train	3	
Cattle on track	5	
Washout	2	
Landslide	2	
Accidental obstruction	2	
Purposely misplaced switch	1	
Unexplained	31	
		— 67
OTHER ACCIDENTS:		
Miscellaneous	4	
		— 4
Total number of accidents		135

The causes of collisions, where given, were as follows:

	Rear.	Butting.	Crossing and other.	Tot'l.
Trains breaking in two	5	..	..	5
Misplaced switch	3	2	..	5
Failure to give or observe signal	1	2	..	3
Mistake in giving or understanding orders	..	7	..	7
Miscellaneous	5	1	6	12
Unexplained	13	12	7	32
Total	27	24	13	64

A general classification shows:

	Collisions.	Derailments.	Other.	Total.	P. c.
Defects of road	1	9	..	10	8
Defects of equipment	5	9	3	17	12
Negligence in operating	26	6	1	33	24
Unforeseen obstructions	..	12	..	12	9
Unexplained	32	31	..	63	47
Total	64	67	4	135	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other.	Total.	P. c.
Passenger	16	27	2	45	23
Freight and other	108	40	2	150	77
Total	124	67	4	195	100

The casualties may be divided as follows:

KILLED.	Collisions.	Derailments.	Other.	Total.
Employés	8	5	..	13
Passengers	1	1	..	2
Others	..	..	..	..
Total	9	6	..	15
INJURED.				
Employés	39	39	3	81
Passengers	7	52	..	59
Others	..	..	..	..
Total	46	91	3	140

The casualties to passengers and employés, when divided according to classes of causes, appear as follows:

	Pass. killed.	Pass. injured.	Emp. killed.	Emp. injured.
Defects of road	..	..	2	8
Defects of equipment	..	..	..	4
Negligence in operating	2	28	8	44
Unforeseen obstructions and maliciousness	..	16	..	5
Unexplained	..	15	3	20
Total	2	59	13	81

Fifteen accidents caused the death of one person each, and 39 caused injury but not death, leaving 81 (60 per cent. of the whole) which caused no personal injury worthy of record.

The comparison with April of previous years shows:

	1890.	1889.	1888.	1887.
Rear collisions	27	19	23	11
Butting "	24	16	20	17
Crossing and other collisions	13	1	6	..
Derailments	67	52	83	58
Other accidents	4	5	4	4
Total "	135	96	136	90
Employés killed	13	22	33	36
Others "	2	23	9	5
Employés injured	81	69	107	74
Others "	59	26	84	34
Passenger trains involved	45	43	46	26
Average per day:				
Accidents	4.50	3.10	4.53	3.00
Killed	0.50	1.50	1.40	1.37
Injured	4.67	2.77	6.20	3.60
Average per accident:				
Killed	0.111	0.483	0 308	0.455
Injured	1.037	0.924	1.368	1.200

There were three particularly serious disasters to passenger trains in April; at St. Charles, Mo., on the 4th; at Tehachapi, Cal., on the 17th, and Staunton, Va., the 28th. At St. Charles the train was running rapidly and five cars rolled down a bank, but nobody was killed. The Tehachapi accident was also highly exciting, but by great good fortune every one came out alive. Though the cars were overturned in a favorable locality, the road in that region is lined with steep precipices and high bridges for miles, and this train had just crossed a long, high trestle. It was but a very short distance from the same spot that 21 passengers were killed on Jan. 20, 1883, when the brakes on a train standing at the station at the top of the grade were released by some unknown person and the cars ran backward down grade without a locomotive and without any trainmen upon them. The Staunton disaster was, like the California one, the result of failure to control the brakes. At Tehachapi it would appear that the conductor and brakemen took reasonably prompt measures to control the train, but the number of men seems to have been too small for a train of 14 cars. At Staunton it is claimed that the baggageman applied the air brake on the baggage car, but there appears to have been serious neglect on the part of the men back of that car. The grade is 70 ft. per mile, and alert and experienced trainmen should have controlled the speed before it reached the rate of 70 miles an hour, as is reported to have been attained. In both these cases the men seem to have simply followed their old habit of depending wholly upon hand brakes when the engineman failed them. The conductor's valve is not allowed to fulfill its function. It is a well-known principle that any device, to be useful in an emergency, must be made more or less familiar in every-day service. To make shop employés or other persons efficient in case of a fire alarm, it is necessary to create fire alarms with unnatural frequency in order to test the men. In like manner, if trainmen are to stop trains in emergencies by the conductor's valve, they ought to be made to use it in their ordinary stops (or in special tests) often enough to make them "familiar with the ropes." All the traditions and habits of trainmen lead them to signal the engineer when they wish to stop the train suddenly. It is plain that these habits need to be modified.

There was another exciting runaway at Shaw, Va., on the 3d, and a complicated affair at Terre Haute on the 12th. As above noted, only one passenger was killed in all the foregoing cases. The remaining fatal casualty to a passenger was at Cle Elum, Wash., on the 21st. This man was in a caboose, which ran back down grade. As in previous similar cases, we class this accident under negligence, as we cannot imagine it ever possible that a man in his senses should be unable to block the wheels of a train, standing still, so as to control it. In fact, collisions are so universally the result of direct negligence in operating that we generally classify them under that head, even when unexplained; but in one case this month, that at Castroville, Cal., on the 30th, where a brakeman was killed, the cause is given as a defective switch, which permitted a train to run upon a side track when it should have continued upon the main line. A by-stander was killed by an accident with the derrick in clearing up a wreck of a train on the Chicago, Santa Fe & California, the 2d, but the case is not included in the casualties, the derailment not being chargeable with it. A furious wind storm, which prevailed in northern Colorado for several days about April 9, caused a comp'ete stoppage of freight traffic on a section of the Union Pacific, and there were many sand drifts of 8 in. and upward in depth. A brakeman was blown off the top of a train and killed. It will be observed that the total of casualties this month is small, the number of persons of all classes killed being only one-third that reported in the same month last year, and but 3⁵ per cent. of the average for the last three years.

How much through passenger business there is now, or may be developed, between Boston and Harrisburg, we do not know; there might be a slight suspicion that the running of a through passenger train between those points, avoiding all the large cities lying between, was undertaken, like Nellie Bly's trip around the world, "just for fun;" but the Central New England & Western has established such a train and will doubtless give the Poughkeepsie bridge a good advertisement by it. The route will at least open an attractive summer excursion line. The trains will be put on June 1 and will leave Boston at 8 a. m., and Harrisburg at 6:25 a. m., making the trip westward in 16 hours, and eastward in 15. The distance between Boston and Harrisburg is 464 miles, the rate of speed, including stops, being thus 31 miles an hour eastward and 29 westward. The trains will run over the Boston & Maine between Boston and Northampton, Mass.; the New York, New Haven & Hartford between Northampton and Simsbury, Conn.; the Central New England & Western between Simsbury and Maybrook Junction (near Campbell Hall), N. Y.; the Lehigh & Hudson River between Maybrook Junction and Phillipsburg, N. J. (the tracks of the Orange County and the Pennsylvania roads being used a part of the way); the Central of New Jersey between Phillipsburg and Allentown, Pa.; and the Philadelphia & Reading between Allentown and Harrisburg. The train is a new, independent train on all the roads east of Allentown, and is thus a distinct addition to the facilities offered the public, aside from the new through route offered.

Secretary Blaine has sent to President Harrison an agreement, adopted at the late International Conference, providing for a preliminary survey for the proposed railroad to connect North and South America, heretofore discussed. President Harrison approves the Secretary's recommendation that this government contribute $65,000 toward the expenses of the survey, the several nations participating in the conference sharing these expenses, according to their respective populations. Mr. Blaine talks eloquently of existing lines of railroad in South America, and of the possible benefits to be secured by an Intercontinental line, but he omits mention of the stupendous difficulties in the way, and of the fact that water transportation must always be by far the cheapest method of communication between North and South America; and both he and the President confine their recommendations strictly to the appropriation for the survey. Congress is asked to authorize the appointment of commissioners, and the detail of engineer officers of the army and navy to take part in the survey. The New York *Tribune*, which may be regarded as an administration organ, takes a conservative view of this scheme, calling attention to the obstacles in the way of the establishment of a profitable railroad.

The New York Central's new time-table shows several changes in through trains, and indicates that some of them will run slightly slower than heretofore. One of the morning express trains out of New York has been discontinued. The Southwestern Limited starts a half hour earlier than heretofore and the Chicago day express an hour earlier. The new "North Shore Limited,' starts at 4:50 p. m., and will take the Detroit and St. Louis sleeping cars, which heretofore went at 6 p. m. The East-bound trip of this train is not so fast as the West-bound; it leaves Chicago at 12:30 p. m., and the running time is 26½ hours. The Pacific Express leaves New York at 9:15, instead of 10 p. m. About a dozen additional local trains have been put on between the Grand Central Station and Spuyten Duyvil. Some of these trains run through to and from Thirtieth street on the west side.

Mr. W. C. Ransom, Deputy Commissioner of Railroads of Michigan, has published a statement of the accidents to men by catching the feet in frogs, switches and guard rails, from which it appears that the law requiring blocks, which has been in force in that State since June, 1883, has worked a decided diminution in the number of accidents. The roads have reported these casualties separate from others since 1880. During that and the four succeeding years the annual aveaage was five killed and six injured. The statistics are, however, so widely variant that one is inclined to doubt whether the roads reported according to a uniform standard. Since 1883, however, there have been no casualties reported, except one injury in 1884 and two deaths in 1887. The two fatal cases were investigated and found to have occurred where blocks had not been put in.

The first annual report of the British Railway and Canal Commission, as created by the Act of 1888, is hardly more than a list of cases heard. As compared with the similar lists of the Interstate Commerce Commission, or even with those of the English Commission, under the Act of 1873, the work seems a mere trifle. The explanation probably is that all parties are awaiting the action of the Board of Trade and other authorities in regard to classification; so that at present hardly anyone tries to predict what the law is going to be six months hence. The revised classification will involve new schedules of maximum rates; and these changes in the schedules might render a decision this year of comparatively little use in the immediate future.

The railroads of the Lower Mississippi Valley have finally emerged from their protracted troubles from high water, through trains on the Louisville, New Orleans & Texas having been resumed on the 14th. At that time there were, however, many pieces of track, on various roads, submerged, though traffic was in most cases carried on under restrictions. The International & Great Northern track was submerged for several miles in the valley of the Brazos River last week.

The report that Mr. J. F. Goddard, Third Vice-President of the Atchinson, Topeka & Santa Fe, has resigned on account of differences with the other officers, which has been published and denied two or three times, is repeated in a private dispatch from Chicago which seems to be based on good authority. It is apparent that there are at least some good grounds for the rumors.

Another case of a train through a drawbridge is reported this week. A freight train went through an open draw on the Delaware Railroad just as a coal tow was passing. The locomotive fell 60 ft. on to a coal barge. Fortunately no one was hurt, but the cost of the wreck would have paid for a good deal of interlocking.

NEW PUBLICATIONS.

Annual Report of the Harbor Commissioners of Montreal for the Year 1889.

This report was presented at a meeting of the Board March 26. Mr. Robertson, the chairman, points out the fact that the increase in tonnage and revenue respectively for 1889 over 1888 was about 15 per cent. each. The chief work of the engineering department during the year was the construction of new wharves at Hochelaga and Maisonneuve, which were so far advanced that some 1,300 ft. of frontage will be available during the coming summer. About $120,000 was spent on construction account and harbor dredging in connection with these wharves. The control of the ship channel works was assumed by the Department of Public Works at the beginning of the year, and these works have been carried on at several points during the year.

The Harbor Master's report shows the arrival at the port of 30 steamers during the year, ranging from 2,000 to 3,262 tons. The various arrivals of these steamers aggregate 317,030 tons. The total tonnage of ocean vessels of all kinds was 763,783 tons. The total ocean and inland tonnage for 1889 was 1,892,225 tons, being the largest for 40 years.

The Commissioners entered into an agreement with the Grand Trunk Railway Co. by which the wharf tracks of the latter were sold to the Harbor Trust. All railroad tracks on the wharfs will now be made one system, which will enable the board to offer equal facilities to all the railroads which can bring cars to the wharves. The question of harbor enlargement has so far advanced that plans approved by the board are now under consideration of the Government.

The report on harbor work Mr. John Kennedy, Chief Engineer, gives considerable interesting information as to the amount and cost of dredging done.

TRADE CATALOGUES.

The Richardson Balance Slide Valve is well described (in a catalogue just issued), together with the valves for pressure and vacuum relief used in connection therewith, and the link motion models made by the estate of F. W. Richardson, at Troy, N. Y. This company also makes a specialty of the manufacture of steel springs of the finest quality, particular attention being paid to those intended for use in safety valves. The balance slide valves are successfully used on a majority of American roads, and the link motion model with its apparatus for describing ellipses indicative of the performance of a link motion design in actual service is becoming a familiar object in railroad drawing rooms.

The Niles Tool Works, of Hamilton, Ohio, have issued a new catalogue of planers of the new 1889 pattern. The cuts are exceptionally fine, showing clearly the construction. Some of the features of these tools are positive feed which will not stick, a 4 to 1 quick return, large bearings and heavy designs. These machines are driven by worm gearing, and are made from 26-in. × 26-in. × 6 ft., weighing 7,000 lbs., to 48-in. × 48-in. × 20 ft., weighing 42,000 lbs., which sizes are always kept in stock. Larger sizes are made for special work, patterns being already prepared up to 10 ft. × 10 ft. to plane any length. Owing to special facilities for manufacture, these tools are offered at moderate prices, the workmanship being guaranteed. One of the largest size is now being constructed for the Midvale Steel Works for taking heavy cuts in steel. Special means are provided for the continuous oiling of the ways of the larger sizes of these tools.

THE SCRAP HEAP.

Notes.

George Francis Train is now on his way westward from New York to Tacoma, Wash., whence he started March 18 on a journey around the world.

The Manhattan Elevated is going to tear down its station on the Second avenue line at Seventy-fifth street in obedience to a judgment issued by the Superior Court in a suit entered by property owners.

A committee of the New Jersey Legislature has been hearing arguments on a bill to annul the Pennsylvania Railroad Voluntary Relief Department. The action is said to be instigated by some of the railroad men's organizations, most of which contain agitators who seem to deem it their duty to oppose all attempts of railroad companies to join their employés in beneficiary organizations. The negotiations between Northern Pacific officers and their engineers and firemen are said to have been settled satisfactorily. There have been strikes of trackmen on the Boston & Maine and of brakemen on the Oregon Division of the Union Pacific, but neither of them seems to have amounted to much.

At a meeting of railroad employés in Philadelphia this week, it was stated that on through trains between Philadelphia and Washington, on the Baltimore & Ohio, the conductors in their fourth year receive $4.12 per round trip, the baggage masters $2.25, and the brakemen $1, while on the Philadelphia, Wilmington & Baltimore the conductors are paid $6, the baggagemen $2.75 and the brakemen $3. Between Philadelphia and Baltimore the wages paid by the Baltimore & Ohio are—conductors $2.96 per round trip, baggagemasters $1.61 and brakeman $1.29; and on the Pennsylvania $4.24, $2.60 and $2.36 per round trip respectively. These figures were given in a statement of grievances by Baltimore & Ohio men, but there would seem to be some mistake in some of them.

Railroad Commissioners' Powers in Iowa.

A decision has been rendered in the District Court at Des Moines by Judge C. A. Bishop which materially limits the powers of the State Board of Railroad Commissioners. Suit was brought by Peter A. Dey, Chairman of the Board, to enforce an order made by it against the Chicago & Northwestern. The order was that one Amundson, living in Hamilton County, should be paid damages for changes in a water course due to the company's grading, and that certain fences should be removed which obstructed Amundson's outlet to the highway. Such orders have frequently been made by the Commissioners and sometimes obeyed by the railroads. The statutes provide that orders of the Commissioners shall be enforced by summary procedure in the District Courts. Judge Bishop holds, in a lengthy opinion, that while the Commissioners have general supervision over all railroads, it is not intended that such power of supervision should extend beyond that class of cases in which the interests of the general public are involved. The Commissioners, in other words, have no power to adjudicate differences arising between private persons or firms and the railroads, and in which the general public is not interested.

Any Relation Between the Two?

It has remained for Jones to put a new sting into an old joke. One of the vice-presidents of the X., Y. & Z. road, his friend, had just refused him a pass. "Don't," he hastened to add, as Jones prepared to speak, "now, don't get off that old gag about our being too slow to pass anything——" "I won't," said Jones peaceably; "I remember you passed a dividend in April."—*Puck.*

Land Slides Extraordinary.

The Grand Trunk commenced running trains last week over the old line, near Dundas, through what is known as the land slide. It will be remembered that this immense slide took place in May, 1886, and put a stop to traffic for several days, until a new track was laid around it. The slide came down the mountain side and covered the track at one point to the depth of about 70 ft., and at other places it carried the track southward down the mountain side The rails were bent like straws before the mass of earth, which brought rock, standing trees, etc., with it. The mass was allowed to stand until about a year ago, when a force of men was put at work to cut a way through it. In 1857 a similar slide, about 200 yards wide, occurred about one and a half miles farther east than the one referred to, which lifted the track with it, forming a long curve, but it did not obstruct traffic, as the line was left nearly in its place on the slide. It took about a year to straighten out the line and remove dangerous material. The cost of the cut through the 1886 slide will be very large.

The Jerusalem-Jaffa Railroad.

The Jerusalem correspondent of the London *Jewish Chronicle* says that the "foundation" for the Jerusalem-Jaffa Railroad was laid on March 21, a celebration, attended by the Pasha and influential persons, with speeches, marking the event. What the "foundation" is we are not told; whether it is the throwing up of a shovelful of "dirt" or the laying of a single sleeper. It seems that the formalities concerning the concession, which has been granted to Turkish subjects, but which must really be carried out by foreigners, have progressed very slowly, and there is no evidence that this opening will be followed by much active work. An engineer, Mr. Etienne, has, however, arrived on the ground. We noted last week the formation of a company, in France, to prosecute this work.

Employes to be Paid Weekly.

A bill requiring weekly payment of employés by manufacturing, mining or quarrying, lumbering, mercantile, railroad (surface, street, electric and elevated) steamboat, telegraph, telephone and municipal corporations, incorporated express companies and water companies, has become a law in New York state, but steam surface roads are excepted from its provisions.

Another Swindler.

An officer of the Atchison writes: "I have received several advices from the East to the effect that a party styling himself A. B. Potter, and representing that he is a conductor on the A. T. & S. F. R. R., has succeeded in securing transportation and obtaining small loans of money. As there has been no such party in our employ, it is unnecessary to add that he is a fraud. It is right that the railroad public should be warned against this party. His last operations, so far as I am advised, were at Buffalo and Dunkirk."

LOCOMOTIVE BUILDING.

The Baldwin Locomotive Works have received an order for 27 locomotives from the Northern Pacific.

H. K. Porter & Co., of Pittsburgh, have about completed a 30 ton saddle tank locomotive with 14 x 24 cylinders and six driving wheels. It is for the Johnson Co., of Johnstown, Pa. A narrow gauge mogul engine to run on curves of 160 ft. radius will soon be shipped to to the Black Hills, S. D.

The Chattanooga Southern has placed an order for six locomotives with the Baldwin Locomotive Works.

The Columbus, Shawnee & Hocking road has six 47-ton engines under contract at the New York Locomotive Works, of Rome, N. Y.

CAR BUILDING.

The Chattanooga Southern has placed an order for 60 freight cars with the Southern Car Works, of Knoxville, Tenn., and for several passenger cars with the Gilbert Car Mfg. Co., of Troy, N. Y.

Twelve new dining cars are being built for the Northern Pacific, and will be put in service about June 1.

The Central Pacific is having three dining cars built at the Pullman Car Works.

The order for freight cars given by the Duluth & Winnipeg to the Minnesota Iron Car Co., of West Duluth, referred to last week, included 50 platform and 10 box cars. The company is also building 200 fruit cars of a new style.

The Chicago, St. Paul, Minneapolis & Omaha has placed an order for 25 furniture cars with the Peninsular Car Co., of Detroit. These cars will be equipped with air brakes and Janney couplers. Three chair cars are being built by the Barney & Smith Mfg. Co., of Dayton, O., which will be equipped with the Johnston reversible chair.

Messrs. C. E. Lucas and A. A. Wood, of Atlanta, Ga., have patented a new "Ventilator-Refrigerator" car, which is to be manufactured by a company whose officers are as follows: G. A. Howell, President; A. A. Wood, Vice-President; W. I. Zachry, Secretary and Treasurer; C. E. Lucas, Superintendent; E. C. Spalding, General Manager. The office of the company is at 44½ Alabama street, Atlanta. The car is said to have done satisfactory service in carrying fresh meat from Chicago to Atlanta.

The Roanoke Machine Works have just delivered 20 gondola cars to the Norfolk & Western, and four new cars to the Rover Iron Co., of Roanoke.

The United States Rolling Stock Co. has orders from the Union Pacific for 500 fruit cars, 400 for freight service and 100 to run on passenger trains, and also for 60 caboose cars for the same company. The Union Pacific has contracted with the Wells-French Co. for two derrick cars.

The United Rolling Stock Co. has received an order from the Wisconsin Central for 1,000 25-ton ore cars, all

to be fitted with Janney couplers and the Westinghouse automatic brakes; 500 will be supplied with the National hollow brake beam and the balance with the Marden brake beam.

The American Fire Proof Steel Car Co. proposes to build shops at Bridgeport, Ala. The plant will include two brick buildings, each one-story 300 80 ft.; two two-story, 80 150 ft.; one two-story, 48 100 ft., and five other smaller buildings. The capital stock is $1,500,000. The officers of the company are: John S. Long, of Louisville, Ky., President; F. H. Foster, of Florence, Ala., General Manager and Vice-President, and R. C. Johnson, of Atlanta, Ga., Secretary.

The Columbus, Shawnee & Hocking has contracted for 800 twenty-five ton coal cars from the Indianapolis Car & Mfg. Co. and the Erie Car Works, and for 200 twenty five ton box cars from the Haskell & Barker Car Co., of Michigan City, Ind.

The South Bound road will place orders for some of its rolling stock before June 1.

BRIDGE BUILDING.

Asheville, N. C.—The French Broad Valley road is to build six iron bridges on its road just placed under contract.

Atlanta, Ga.—The city council of Atlanta, has been asked to build a new bridge across the railroad tracks at Forsyth street, Atlanta.

Baltimore, Md.—A bill to appropriate $80,455 for the completion of the Light street bridge, Baltimore, has been favorably reported to the city council

Charleston, W. Va.—Drake & Stratton, of Pittsburgh, Pa., are reported to have the contract for constructing the bridge of the Charleston & South Side Bridge Co. over the Kanawha River at Charleston.

Columbus, O.—The Columbus Bridge Co. has been awarded a contract for the superstructure of the Lane avenue bridge at $9,915.

Davenport, Ia.—The Board of Supervisors propose to build a new bridge at Davenport, Ia.

Erie, Mo.—The King Iron Bridge & Mfg. Co. of Cleveland has been awarded the contract to build an iron bridge over the Elk River south of this point for the Kansas City, Fort Smith & Southern. The contract for the bridge over the Cowskin River has not yet been awarded.

Fort Worth, Tex.—The recent floods of the Trinity River caused a landslide near Fort Worth which has done serious damage to the long iron bridge built a year ago at a cost of $35,000. It has not yet been decided what plan to adopt to repair the structure.

Georgetown, D. C.—A survey has been made by the Baltimore & Ohio for a bridge across the Potomac River at Georgetown in connection with a proposed branch.

Huntington, W. Va.—Leete Bros. have the contract to construct the iron bridge at Huntington for about $5,500.

Knoxville, Tenn.—Lane Bros., of Newark, O., have received the contract to build two iron bridges over Beaver Creek at Knoxville.

Morristown, Pa.—The city engineer will probably soon complete plans for a new bridge at this point.

New York City.—The New York Central & Hudson River road is to replace the iron truss bridges at 112th and 113th streets on Fourth avenue in New York city with four-track solid floor bridges having 65 ft. spans.

Northampton, Mass.—The special commission appointed to apportion the amount the city of Northampton, the county of Hampshire and the New York, New Haven & Hartford road should each pay in the construction of the bridge across Mill River, have made their award as follows: The railroad to pay 60 per cent. of the cost of the bridge and the city 40 per cent., and the county to pay the land damage. The bridge will cost $45,000 and the land about $10,000.

North Stratford, N. H.—There will probably be seven spans of iron bridges, each about 100 ft. in length, on an extension of the Maine Central, from North Stratford to Hazens Junction.

Philadelphia.—A bill is before the common council to appropriate $35,000 to build a new bridge under the tracks of the Philadelphia & Reading on the line of Penn street at the Falls of Schuylkill.

The new bridge which is being built by Cofrode & Saylor for the City Avenue Bridge Co. across the Schuylkill below the mouth of the Wissahickon River will be completed next week. The structure is of iron, built upon stone piers and abutments of substantial masonry. The structure is a single deck truss-girder bridge, having five spans, with an entire length of 760 ft. The first span crosses the Philadelphia & Reading tracks, the other three span the river, while the fifth extends from a shore pier to the eastern approach in Fairmount Park. The roadway is 30 ft. wide, with a sidewalk six ft. wide on each side.

Pierre, S. D.—The pontoon bridge across the Missouri river, between Pierre and Stanley, was completed last week. It is over a mile long.

Pineville, Ky.—L. S. Fitzhugh, of Pineville, will receive proposals until May 30 for one of the bridges referred to last week. It will be a combination wood and iron bridge.

Pioneer, O.—The town will probably soon build a new bridge across Clear Fork Creek.

Pittsburgh, Pa.—The Pennsylvania may erect a bridge over its tracks, connecting Bellefield and Bloomfield avenues.

Pottsville, Pa.—The Court of Common Pleas of Chester County has approved the report of the site for a new bridge over the Schuylkill at Pottstown, and has issued a decree for the building of the structure.

Savannah, Ga.—The South Bound road will build six or seven iron bridges on its line between Savannah, Ga., and Columbia., S. C., now being surveyed.

Towson, Md.—W. H. Shipley has submitted specifications for two bridges, one leading eastward at Jessop's, the other over Scott's Level Run, in the second district.

Vernon, Tex.—The county commissioners will probably build another bridge over Pease River.

Washington, D. C.—The House committee has reported favorably the Senate bill for a bridge over the Arkansas River at Pine Bluff, Ark., and the House bill for a bridge at Guntersville, Ala.

Wheeling, W. Va.—The notice concerning the Wheeling & Eastern Improvement Co., of which George P. Bissel, of Hartford, Conn., is President, printed under this heading last week, was misleading The company was incorporated in Connecticut a year ago, and the filing of a charter in West Virginia last week was only a formal legal action. This is the construction company which built the Union Bridge across the Ohio River at Wheeling for the Wheeling Railway Bridge & Terminal Co. The company is now condemning property in Wheeling for a bridge over Wheeling Creek and for a union station.

Jolly Bros. of Pittsburgh, have been awarded the contract to build the substructure of the Wheeling Bridge Co.'s two bridges for $145,000. The total cost of the bridge will be about $552,000. The bridge will be built from Wheeling to Wheeling Island and thence to Etnaville, O.

York, Ont.—The Dominion parliament has appropriated $30,000 towards the construction of an iron bridge over the Grand River, at York, County of Haldimand, Ont.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Delaware & Bound Brook, quarterly, 2 per cent., payable in May.

Northern Pacific, quarterly, 1 per cent. on the preferred stock, payable June 15.

North Pennsylvania, quarterly, 2 per cent., payable May 26.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Burlington, Cedar Rapids & Northern, annual, Cedar Rapids, Ia., May 27.

Calgary & Edmonton, special, Windsor Hotel, Montreal, P. Que., May 26.

Canada Southern, annual, St. Thomas, Ont., June 4.

Chicago & Eastern Illinois, annual, Chicago, Ill., June 4.

Chicago & Northwestern, annual, Chicago, Ill., June 5.

Chicago, Rock Island & Pacific, annual, Chicago, Ill., June 4.

Chicago, St. Paul, Minneapolis & Omaha, annual, Hudson, Wis., June 7.

Denver & Rio Grande, annual, Denver, Col., May 27.

Des Moines & Fort Dodge, annual, Des Moines, Ia., June 5.

Louisville, New Orleans & Texas, special, Memphis, Tenn., June 5.

Middletown, Unionville & Water Gap, annual, New York City, May 26.

Milwaukee, Lake Shore & Western, annual, Milwaukee, Wis., June 11.

St. Joseph & Grand Island, annual, Elwood, Kan., June 10.

St. Louis, Alton & Terre Haute, annual, St. Louis, Mo., June 2.

St. Louis & San Francisco, special, St. Louis, July 21, to vote on the proposition of an increase of the common stock of the company.

Railroad and Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Master Car Builders' Association* will hold its next annual convention at Old Point Comfort, Va., June 10. Rooms should be secured of Mr. F. N. Pike, manager, Hygeia Hotel, Fortress Monroe, Va.

The *American Railway Master Mechanics' Association* will hold its next annual convention at Old Point Comfort, Va., beginning June 17.

The *International Association of Car Accountants* will hold its fifteenth annual convention at the Hotel Brunswick, New York City, June 24, 25 and 26.

The *Association of American Railway Accounting Officers* will hold its next annual meeting at the Stockton Hotel, Cape May, N. J., July 9.

The *National Association of General Baggage Agents* will hold its next annual convention at Chicago, Ill., July 16.

The *Traveling Passenger Agents' Association* will hold its next annual convention at Buffalo, N. Y., August 19.

The *New England Roadmasters' Association* will hold its eighth annual meeting at Boston, Mass., Aug. 20 and 21.

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Tifft House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *Northwest Railroad Club* meets on the first Saturday of each month in the St. Paul Union Station at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Saturday following the second Wednesday of each month at 7:30 p. m. in the director's room of the St. Paul Union station, except in the months of July and August.

The *American Society of Civil Engineers* holds its regular meeting on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at Boston, at 7:30 p. m., on the third Wednesday in each month. The next meeting will be held at the American House.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1,122 Girard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month at the Club rooms, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8:00 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the Fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the Southwest* holds regular meetings on the second Thursday evening of each month at 8 o'clock, at the Association headquarters, Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Club of Kansas* holds regular meetings on the first Wednesday in each month at Wichita, Kan.

Buffalo Superintendents.

The monthly meeting and annual election of the Buffalo Association of Railway Superintendents was held last week at the Tifft House, with President Seabert in the chair. President Seabert was re-elected. Division Superintendent Brunn, of the Erie, was elected Vice-President, and Assistant Superintendent Ketchum, of the West Shore, Secretary and Treasurer. The next meeting will be held June 11.

Civil Engineers' Club of Cleveland.

A meeting was held May 13, 1890, President William H. Searles in the chair; 20 members present.

The Executive Board reported favorably upon the applications of the following gentlemen: For associate membership: Joseph Daniels, Thomas Metcalf Irvine, William Lindsley Otis, and for active membership: Edward P. Roberts, William H. Dunn, James C. Hallsted, John H. Hilton and William F. Biggar.

The resignation of Mr. C. O. Palmer, as Secretary of the club, was read and accepted, and a vote of thanks tendered him for his services.

A memoir of the life of James S. Oviatt was read by Mr. John Whitelaw, Chairman of the Committee.

The report of the Committee on Affiliation with the American Society of Civil Engineers was presented by Mr. Mordacai, Chairman, including a letter from Mr. J. F. Holloway. Report was accepted and committee requested to attend the conference of committee in New York, if possible. Mr. Thompson reported that he had procured the carved stone, containing the name of Charles Latimer, and had placed it in the club room, and now presented the same to the club. A vote of thanks was tendered Mr. Thompson for this memento.

The paper of the evening, entitled "Experiences in the Construction of Gas-Holder Tanks," was read by Mr. G. A. Hyde, and followed by a general discussion. The paper cited the difficulties of founding large tanks on a hillside composed of alternate layers of quicksand and clay; one of the early tanks has shown some disturbance and is to be emptied for examination. The discussion was upon the soils in and about Cleveland, and on various methods adopted in laying foundations.

The president announced that at the June meeting Dr. H. Poole would present a paper, entitled "Ferroid," a new artificial stone.

Engineers' Club of Philadelphia.

A meeting was held May 3. President H. W. Spangler in the chair; 23 members and one visitor present.

The Secretary presented, for Mr. William H. Dechant, a paper on the mountain railroads of Reading, Pa. The city of Reading and its surroundings are generally described and full description given of these roads. The paper was accompanied by a typographical map which had been made by Mr. E. V. d'Invilliers. On this map the alignments of the roads have been placed, at the instance of Mr. d'Invilliers, thus giving an excellent idea of their character and surroundings. The scenery, from numerous stretches of these railroads, is grand and beautiful. Their accessibility from Philadelphia other cities is a great advantage. They are operated in general as gravity roads usually are.

The Secretary presented, for Mr. J. Foster Crowell, a paper on the Interoceanic Canal Prospect in 1890 from notes on the spot in Panama and Nicaragua. He describes the extravagant ruins of machinery and executed work which prevail along the Panama Canal, and expresses his opinion that its completion is utterly hopeless. On the other hand, he expresses every confidence in the economical and satisfactory completion of the Nicaragua route.

Mr. Edwin S. Crawley presented a paper, translated from the French, on the Lobnitz system for the demolition of rocks under water without explosives. The principle of the system consists in producing a shattering of the rock by the action of a heavy mass let fall from a convenient height and acting like a projectile upon the wall of a fortress.

New England Water Works Association.

The ninth annual convention will be held at Portland, Me., June 11, 12 and 13, 1890. From Boston, members have the choice of a rail or water route to Portland. Fare by rail, round trip (Boston to Portland and return), $5. An effort is being made to secure a lower rate, and if it is successful, members will be duly notified. By water, by the Portland Steamship Co.'s steamers, which leave India Wharf, Boston, daily at 6:30 p. m. The fare is $1, which includes berth. The headquarters of the association during the convention will be at the Falmouth Hotel.

The Engineering Association of the Southwest.

The regular May meeting of the Engineering Association of the Southwest was held on the evening of May 8, Treasurer Dr. W. L. Dudley presiding, with the usual attendance of visitors and members.

Messrs. Kenneth McDonald and Donald McDonald, members of the firm of McDonald Bros., architects, of Louisville, Ky., were elected as members, and Mr. Dexter Belknap, cement manufacturer of Louisville, Ky., was elected as associate.

The report of the Executive Committee on the matter of affiliation with the American Society of Civil Engineers, which had been referred to the committee at the April meeting, was presented. The report recommended that the Association maintain its independence in all matters of business management, ownership of property and qualifications for membership, but favors an affiliation with the American Society so far as pertains to the publication of papers, the exchange of papers and periodicals, a systematic provision by which accredited members of each organization shall attend the meetings of other organizations, and a systematic co-operation in the extension of mutual courtesies to members and strangers. The report presents at some length the views

of the committee on the general relation of engineering societies to one another, maintaining that, as three distinct divisions of functions exist, namely: those of a purely general nature, those of a professionally special nature and those of a purely local nature; that corresponding distinctions should be made in the organization and scope of engineering societies, and suggests that there should be one national organization which should deal only with matters of the first class, namely: those of a purely general nature, but that such organization might divide itself into special sections for the consideration of matters of a professionally special nature. As a means of accomplishing the above classification of society work, the report suggested the advisability of the consideration on the part of the American Society of Civil Engineers whether or not a certain co-ordination might not be entered into by that body and the American Society of Mechanical Engineers, the American Institute of Mining Engineers, the American Institute of Electrical Engineers and the American Institute of Architects, the several societies retaining their independent character so far as concerns their individual government and the treatment of matters falling in their own specialties, but acting together as a unit on matters of a purely general nature which affect all or several branches of engineering in common. An incidental advantage of such a federation being that by united efforts the several societies could together provide a building in common which should meet the general as well as the special requirements of each of the several societies, the same being true of a library in common, and a general publication containing the transactions of each society. After some discussion the report was unanimously adopted, and a committee composed of President John MacLeod, Secretary Olin H. Landreth, and Vice-President W. F. Foster was appointed to represent the Association before the meeting of the Special Committee of the American Society in New York in June, at which time representatives of the several local organizations have been invited to meet with the committee of the American Society.

Mr. George Reyer, Superintendent of Water Works, Nashville, Tenn., then read a paper entitled "The Recent Duty Test of the Holly-Gaskill Pumping Engine at the Water Works, Nashville, Tenn."

The programme of the evening was closed by Mr. Landreth, who exhibited and explained the working of a binocular hand level recently put on the market by a leading firm of instrument makers. The accuracy of work done with the instrument was stated to be absolutely dependent on a perfectly balanced condition of the vertical muscles moving the two eyeballs of an observer, a condition, oculists state, that very rarely exists. Mr. Landreth presented in support of his theoretical objections, the result of a series of experiments with nine engineering students accustomed to precise instrumental work but selected at random and without any knowledge of the condition of their eyes. The mean of three settings by each student of a target at 500 ft. distance with the instrument on a firm support gave a maximum difference among any two of the nine observers of 2.16 ft., and a mean error for the nine observers of 0.49 ft., while corresponding settings with a Locke Hand Level of two settings by each student—the instrument being similarly supported—gave a maximum difference of only 0.6 ft. between any two observers and a mean error of .17 ft., showing the ordinary Locke level to be subject to about one-third the error of the binocular form.

PERSONAL.

—It is understood that Mr. E. T. Jeffery, formerly General Manager of the Illinois Central, has been appointed Vice-President of the Lake Shore & Michigan Southern.

— Mr. C. W. Cook, General Freight and Passenger Agent of the Kansas City, Wyandotte & Northwestern, has resigned that position to become General Freight Agent of the Kankakee line, with headquarters at Chicago.

—Mr. William W. Thurston, President of the Bethlehem Iron Co. and of the Juricaga Iron Co., of Cuba, died in London, Eng., last week. He was returning with his family from a trip in Egypt, where he had gone for his health.

—Mr. J. V. Parker, Assistant Freight and Passenger Agent of the Mountain Division of the Union Pacific, with headquarters at Salt Lake City, has tendered his resignation. Mr. Parker has held this position since October, 1887, his title at first being Division Freight and Passenger Agent.

—Mr. Samuel Phillips, late Commissioner of the Memphis Freight Bureau, has been appointed Commissioner of the Cincinnati Freight Bureau, an office which has just been created by the Cincinnati Board of Trade. The Memphis papers refer to Mr. Phillips as a man particularly efficient in an office of this kind.

—Mr. Daniel McLaren, Superintendent of the Mobile Division of the Mobile & Ohio since August, 1886, has been appointed General Superintendent of the entire line. Before his connection with the Mobile & Ohio, Mr. McLaren was Superintendent of the Alabama Great Southern from January 1, 1884, to August, 1886, and was previously General Superintendent of the Cincinnati, Selma & Mobile.

—Mr. Wirt Dexter, General Solicitor of the Chicago, Burlington & Quincy, died suddenly at his home in Chicago, May 17, of heart disease. He was born in Dexter, Mich., in 1833. He was a member of the law firm of Dexter, Herrick & Allen, and as Solicitor of the Burlington road he gained an enviable reputation, and was one of the best railroad lawyers of the West. He leaves a widow and two children—a son and daughter.

—Mr. Frank A. Leers, C. E., member Am. Soc. C. E., and Chief Engineer of the Passaic Rolling Mill Co., died at his home in Paterson, N. J., on the 19th inst., the result of a paralytic stroke received on the preceding Friday. Mr. Leers had suffered greatly from rheumatism for the past two years, which affected his head at times. He was born in Germany 44 years ago. While in charge of the engineering department of the Passaic company for the last 12 years, he designed many notable structures built by them, the most prominent being the Washington Bridge, New York City. His high abilities made him desirable counsel for many of his profession, but, with it all, he was one of the most unassuming of men. His death is a severe loss from the ranks of the bridge engineers.

—Mr. David S. Cofrode, a leading contractor and builder, died May 18 at his home in Philadelphia in his 44th year He was born on a farm at Dauphin, in Dauphin County, and after passing his youth at farm work entered the works of Cofrode & Saylor, in which his eldest brother, Joseph Cofrode, is senior partner. For about 15 years he was the foreman for that firm. Mr. Cofrode did a great deal of work for the Pennsylvania Railroad, and during the great floods of last year did much to help restore the roadbed and bridges, being allowed large discretion in his work. Among the structures he erected were the large warehouses at Eighteenth and Market streets, the two temporary bridges across the Schuylkill River at Market street, and the ferry house at Jersey City. Recently he had been doing work for the New York, Lake Erie & Western. It is stated that Mr. Cofrode was accustomed to pay the wages of workmen laid up by accidents, and thus never had more than one suit for damages for injuries, and that one he gained. He leaves a wife and two children.

ELECTIONS AND APPOINTMENTS.

Altoona & Wopsononock.—The directors of this Pennsylvania road are: F. G. Patterson, M. A. Green, W. L. Shellenberger, John A. Canan, M. Scott Gwin, C. A. Wood, W. W. Yon, W. S. Lee, S. M. Griffith and A. C. Shand. The officers are: F. G. Patterson, President, M. A. Green, Vice-President, H. J. Davis, Secretary and S. J. Westley, Treasurer. The office of the company is 1,307 Eleventh street, Altoona, Pa.

Asheville & Bristol.—The names and addresses of the officers of this company are as follows: C. G. Dyott, President and General Manager, 52 Wall street, New York City; W. M. Cocke, Jr., Vice-President, Asheville, N. C.; D. C. Fisk, Treasurer, New York; J. E. Rankin, Assistant Treasurer, Asheville, N. C.; E. B. Williams, Secretary, New York; H. M. Ramseur, Chief Engineer and Superintendent, Asheville, N. C., and H. H. Mansfield, Purchasing Agent, New York.

Baltimore & Drum Point.—Nicholas Goldsborough is Chief Engineer of this company, and George W. Cunard, Sr., is Assistant Engineer, both of Baltimore. Oliver W. Barnes, 57 Broadway, New York City, is Consulting Engineer.

Buffalo, Thousand Islands & Portland.—The directors of this new road are: Edwin Parsons, Charles Parsons, Clarence T. Day, Charles Parsons, Jr., Joseph A. Sawyer, Edwin Parsons, third, Charles G. Burnham, William T. German, George Parsons, of New York.

Calgary & Edmonton.—James Ross, Edmund B. Osler, Herbert C. Hammond, William McKenzie, Nicol Kingsmill, Herbert S. Holt and Donald D. Mann are the Provisional Directors of this company. The office is in Montreal.

Chicago, St. Paul & Kansas City.—Mr. Charles R. Berry, for two years General Agent for the Chicago, St. Paul & Kansas City at St. Joseph, Mo., has been appointed Assistant General Freight Agent of the same line with headquarters at St Joseph.

Chicago, St. Paul, Minneapolis & Omaha.—E. R. Ober has been appointed Acting Assistant General Freight Agent of the road, with office at St. Paul, Minn., to succeed the late Stanley Proudfit.

Cleveland & Canton.—The annual meeting of the road, held at Canton, O., May 14, resulted in the election of the following board of directors: H. A. Blood, W. J. Rotch, William Rotch, Henry C. Ranney, H. S. Emery, H. S. Belden, S. F. Payne, William Edwards, W. O. Chapman, George N. Smalley, Franklin W. Hopkins, Edward S. Flint, A. C. Barstow, Jr., J. K. Taylor and Isaac N. Penerok.

Cleveland, Canton & Southern.—At the annual meeting of the road at Canton, O., May 14, the following directors were elected: H. A. Blood, W. J. Rotch, Henry C. Ranney, William Rotch, H. S. Emery, S. T. Payne, William Edwards, W. O. Chapman, George H. Smalley, Franklin W. Hopkins, Edward S. Flint, N. C. Barstow, Jr., J. H. Taylor, I. N. Pennock and H. S. Belden.

Cumberland, Fort Payne & Atlantic.—The incorporators of this Georgia road are: Stephen E. Dobbs, Henry B. Campbell, A. J. McBride, R. C. Johnston, L. L. Cochran, H. A. Fitzpatrick, William N. Ewing, J. G. Dobbs, L. A. Dobbs, William H. Forney, S. K. McSpadden,

Fort Payne & Eastern.—The officers of this road are: President, J. W. Spaulding; General Manager, C. O. Godfrey; Chief Engineer, W. T. Carley, all of Fort Payne, Ala.

Fort Worth & New Orleans.—At a meeting of the stockholders of the road held at Waxahachie, Tex., May 14, directors were elected as follows: C. Dillingham, Daniel Ripley, E. W. Cave, Hans Helland, L. A. Daffan, E. H. Pardee and F. H. Davis. The directors elected: President, C. Dillingham; Vice-President, Hans Helland; Secretary and Treasurer, L. W. Wheeler.

Georgia.—At the annual meeting held at Augusta, Ga., May 13, the following board of directors was elected: C. H. Phinizy, President; Stevens Thomas, George Hillyer, Wm. M. Reese, Joel A. Billups, H. D. McDaniel, H. H. Huckman, N. L. Hutchins, J. H. Alexander, D. N. Speer, A. W. Calhoun, T. W. Coskery, Leonard Phinizy, William E. McCoy, Boykin Wright, James White, R. D. Spalding.

Indiana Northern.—The directors of the company met in Goshen, Ind., yesterday, and organized by the election of J. H. Baker, of Goshen, President; C. P. Leland, Secretary and Treasurer; and George H. Kimball, Chief Engineer. These are all connected with the Lake Shore & Michigan Southern, which will build the line.

Michigan Central.—The Michigan Central having acquired control of the Bay City & Battle Creek and Battle Creek & Sturgis roads, the jurisdiction of its General Officers is extended over those lines.

Missouri Pacific.—C. A. Tripp, Commercial Freight Agent of the company at Pueblo, has been appointed to succeed P. J. Flynn as General Western Freight and Passenger Agent, with office at Denver.

Mobile & Ohio.—Daniel McLaren has been appointed General Superintendent of the road and its leased lines and branches, and has charge of the transportation, road and machinery departments.

Montreal & Vermont Junction.—The following officers were recently elected at a meeting held at Stanbridge, Que.: J. S. Brigham, President; J. Gregory Smith, Vice-President; A. H. Gilmour, Secretary and Treasurer, and G. G. Smith and J. D. Hatch Managing Directors.

Nescopec.—At the annual meeting of the road held at Philadelphia, Pa., May 13, the following were elected directors: J. N. Du Barry, President; John P. Green, Henry D. Welsh, J. C. Bright, N. P. Shortridge, Wistar Morris and Amos R. Little.

New York, Bridgeport & Eastern.—The following are directors of this Connecticut Company; Henry R. Parrott and G. L. Whitor, of Bridgeport, George Cowles, Edward K. Lockwood, and Clarence B. Coolidge, of Norwalk; James D. Mowry, of Norwich; George E. Spare and L. B. Adams, of New Haven; Thomas N. Brown and Charles D. Ingersoll, of New York; William Rotch, of Boston; George S. Forbush, of Brookline, Mass.; and W. W. Douglas, of Providence, R. I.

New York Central & Hudson River.—William Flannelly has been appointed Southwestern Passenger Agent, with headquarters at No. 97 Clark street, Chicago, to succeed O. E. Jenkins, resigned.

New York & Harlem.—The sixtieth annual election of the company was held in the Grand Central Station, New York City, May 20. The following were elected directors: Cornelius Vanderbilt, William K. Vanderbilt, Frederick W. Vanderbilt, Samuel F. Barger, Chauncey M. Depew, Charles C. Clarke, John B. Dutcher, John E. Burrill, William H. Leonard, Francis R. Freeman, Samuel D. Babcock, Alfred Van Santwood and Robert Schell.

New York, St. Louis & Kansas City.—The first board of directors is: J. E. Williams, E. C. Rice, Alexander Flannigan and B. H Canby, of East St. Louis; G. H. Ten Broeck, of St. Louis, and Josiah Cratty and Thomas Cratty, of Chicago.

Niagara Falls & La Salle. The incorporators of this New York road are: H. Walter Webb, Walter Katte, W. J. Van Arsdale, John M. Toucey, Theodore Voorhees, John B. Dutcher, D. W. Tears, of New York City; Sherman S. Jewett, George H. Burrows, Edson J. Weeks, Daniel H. McMillan, James F. Gluck, of Buffalo, N. Y.; and David Phillips, of Niagara Falls, N. Y.

Pittsburgh, Fort Wayne & Chicago.—The annual meeting of the stock and bondholders of the company was held in Pittsburgh, Pa., May 21, and the following retiring directors re-elected: John M. Hutchinson, of Philadelphia; William Hooper, of Cincinnati, and L. Z. Leiter, of Chicago.

Portland, Port Angeles & Victoria.—The trustees have elected the following officers: C. J. Smith, President, Portland, Or.; Lewis Levy, Vice-President, Port Angeles, Wash.; E. B. Mastick, Jr., Secretary-Treasurer, Port Angeles.

Pueblo & State Line.—The annual meeting was held in Pueblo, Col., May 14, and the following directors were elected: S. H. H Clark, George E. Smith, E. G. Merriam, St. Louis; Charles Henkel, H. P. Holbrook, Pueblo.

Rio Grande Western.—E. J. Yard, Resident Engineer, has been appointed Chief Engineer, to succeed George Goss. G. W. Snow has been appointed Resident Engineer.

St. Joseph Terminal.—L. J. McQuade, Contracting Freight Agent of the Atchison, Topeka & Santa Fe, has been appointed Superintendent of the road, with office at St. Joseph, Mo., to succeed J. P. O'Brien, resigned.

St. Louis, Kennett & Southern.—The officers of this road are: President, E. S. McCarty; Vice-President, A. J. Kerfoot; Secretary, George Denison; Chief Engineer, John P. Taylor. The principal offices of the company are at 517½ Chestnut street, St. Louis, Mo.

St. Louis & San Francisco.—The new Board of Directors of the Company have elected the following officers: President, Gen. E. F. Winslow; Vice-President and General Manager, Henry L. Morrill; Secretary and Treasurer, T. W. Lillie.

San Antonio & Aransas Pass.—Homer Eads having resigned to accept service elsewhere, W. E. McDonald has been appointed Commercial Agent in charge of Galveston and Houston business, with headquarters at Galveston, Tex.

Sioux City & Northern.—The following board of directors was elected at the annual meeting held in Sioux City, Ia., May 14: John Hornick, E. Harkinson, James E. Booge, D. T. Hedges, A. S. Garretson, T. P. Gere, F. C. Hills, J. H. Wall, C. L. Wright. Officers were elected as follows: T. P. Gere, President; Jas. E. Booge, Vice-President; F. C. Hills, Secretary; A. S. Garretson, Treasurer.

Southern Kansas.—These directors were elected at the annual meeting in Topeka, Kan., last week: A. Manvel, Chicago; G. C. Magoun, W. Libbey, J. J. McCook, New York; B. P. Cheney, Warren Sawyer, Alden Speare, S. L. Thorndike, all of Boston; C. H. Pratt, Humboldt; O. E. Learnard, Lawrence; E. M. Hewins, Cedar Vale.

Toledo, St. Louis & Kansas City.—John Orton has been appointed Superintendent of Rolling Stock of the road, with headquarters in Delphos, O., vice T. Robertson, resigned to accept service on another road.

Union Pacific.—A. C. Hincley, formerly Inspector of Locomotives and Machinery, has been appointed Assistant Superintendent of Motive Power of the same company, with headquarters at Salt Lake City, and will have charge of the Wyoming, Utah and Idaho divisions.

A. J. Ratcliffe has been appointed Traveling Passenger Agent of the Gulf Division, with headquarters at Fort Worth, Tex.

William Williams, Superintendent of the St. Joseph & Grand Island, has been promoted to the position of Roadmaster of the St. Joseph & Grand Island, and the Kansas Central and the Leavenworth Division of the Union Pacific. Mr. Williams will be succeeded as superintendent by J. P. O'Brien, Superintendent of the St. Joseph Terminal road.

Virginia Mineral.—At a meeting held in Norfolk, Va., last week these directors were elected: F. G. Kimball, President; Joseph I. Doran, F. J. Kimball, W. G. McDowell, C. H. Clark, W. C. Bullitt and James A. Walker.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Akron & Chicago Junction.—Grading has been commenced on this road at Lodi, Medina County, O., and will also soon be commenced at Chicago Junction. The location has not yet been completed between Lodi and Akron nor have the contracts been let. The road is to extend from Chicago Junction on the Baltimore & Ohio to Akron on the Valley road, 68 miles. It will pass through Homer, Medina County, Sullivan and Ruggles, Ashland County, and several other small towns.

Altoona & Wopsononock.—W. T. Forscythe, formerly Chief Engineer of Construction on the Norfolk & Western, has nearly completed the survey for this nar-

row gauge road, which is projected to extend from the city of Altoona, Pa., to the Wopsononock summer resort, and thence into the coal and timber lands lying immediately beyond. The capital stock is $75,000. Frank G. Patterson, of Altoona, is President.

Asheville & Bristol.—The contract for building this line has been let to James Raymond, of New York. The road is to extend from Asheville, N. C., north to a connection with the Bristol, Elizabethton & North Carolina, a distance of 55 miles. The construction work is to begin Aug. 1. The maximum grade is 88 ft. and the maximum curve six degrees. C. G. Dyott, 52 Wall street, New York City, is President and General Manager.

Baltimore Belt.—The stockholders have accepted the amended bill passed by the city councils of Baltimore, granting the road right of way through certain of the city streets. It is stated that grading will soon begin. The heaviest work will be in the eastern section of the city, near the Baltimore Cemetery. When the tunneling begins the work will be continued night and day. The force will be divided into three shifts, each working eight hours. The construction will be under the supervision of John B. McDonald, of Ryan & McDonald.

Baltimore & Eastern Shore.—The road has been graded as far as Vienna, Md., and work on the bridge across the Nanticoke River is about half finished. Vienna is about 15 miles south of Preston, to which point the tracklaying has been completed. The grading on the Wicomico side is also progressing. The company expects to have trains running between Baltimore and Ocean City in July.

Baltimore & Ohio.—A corps of engineers are said to be making a survey from Georgetown, D. C., across the Potomac River to Fairfax, Va., on the Virginia Midland, below Alexandria.

Birmingham, Jackson & Kansas City.—It is stated that the company has decided not to build to either Dyersburg or Newbern, Tenn., but to change its route so as to connect with the road of the Newport News & Mississippi Valley Co. at a point between these two towns. The road is to commence at Jackson and will pass through Bell's Depot, Alamo, Crockett Mills and Friendship.

Bristol & Elizabeth.—At an election held in Carter County, Tenn., May 10, this company was voted a subsidy of $50,000.

Brunswick, Attawaha & Northern.—This company has been organized in Georgia to build a road from Brunswick, Ga., to some point in McIntosh County. W. E. Kay, C. P. Goodyear and J. T. Dent are among the projectors.

Buffalo & Geneva.—The construction of this road was begun last week at Stafford, N. Y., by Darling & Kennedy, of Binghamton, who have the contract for sections 56 to 70.

Buffalo, Thousand Islands & Portland.—Officers of the Rome, Watertown & Ogdensburg filed articles of incorporation for this company in New York this week. The road is to extend from Buffalo to Suspension Bridge and Niagara Falls, about 35 miles, with a one-mile branch extending from a point on the main line in the village of Niagara Falls westerly to the Niagara River. This will give the Rome, Watertown & Ogdensburg its own road to Buffalo. The capital stock is $500,000.

Camden Belt.—The Board of Trade of Camden, N. J., has appointed a committee to consider a proposed belt line along the Delaware River front to connect the Pennsylvania and Philadelphia & Reading systems.

Canadian Pacific.—Grading was commenced this week on the Southwestern road, which is to extend from Caughnawaga to Valleyfield, Que., near the New York State line, where connection will be made with a road to be built from Malone, N. Y., on the Central Vermont. The road will parallel the Valleyfield branch of the Grand Trunk, extending from St. Martin Junction to Valleyfield, 20 miles.

Cape Breton.—Application will be made to Parliament at its next session for an act to incorporate a company to build a road in Cape Breton connecting with the present Dominion road now under construction from Orangedale, in Inverness, to Broad Cove coal mines, a distance of 34 miles, and thence to Cheticamp, and Baddeck, in Victoria county, a distance of 35 miles. Also for a line from the Richmond coal mines, connecting with the present Cape Breton road, via St. Peters to Louisburg, 78 miles, with power to acquire coal mines or other railroad companies chartered by the Government of Nova Scotia.

Chicago, Burlington & Quincy.—An arrangement has been made with the Harney Peak Tin Mining and Manufacturing Co. and the Harney Peak Consolidated Mining Co. by which the company is to build a road about 20 miles long, through the properties of those companies to Hill City, S. D. The contracts for grading the line have already been let and the construction will begin immediately.

Chicago, Milwaukee & St. Paul.—It is stated that the company will build a short branch from its main line northwest of Elgin, Ill., north to Dundee, and thence probably to Lake Geneva. The report that the company intended to soon begin an extension from Chamberlain, S. D., west to the Black Hills is denied.

Chicago, St. Paul, Minneapolis & Omaha.—The contract for building the extension of the Goodyear, Neillsville & Northern from Neillsvile to Marshfield, Wis., 27 miles, has been awarded to Shepard, Siems & Co., of St. Paul.

Cincinnati, Wabash & Michigan.—Grading on the extension from Anderson to Rushville, Ind., 40 miles, was begun at Anderson, May 13, by Oliver Ferguson & Co., of Bedford, Ind., who have the contract. About 200 teams are engaged in the work at present. The extension is to be completed ready for operation by Aug. 15.

Cumberland, Fort Payne & Atlantic.—This company has been recently incorporated in Georgia to build a road in the interest of the Georgia, Tennessee & Illinois, from Bridgeport, Ala., to Middlesborough, Ky. The survey has been made from Bridgeport for 67 miles, and the cost of building this section is estimated at $12,000 per mile. It is stated that construction will begin early in September. The survey will be continued from Bridgeport to Tallapoosa, Ga., and thence to Atlanta, 55 miles further east. J. W. Kelly is Chief Engineer. A. J. McBride, of Atlanta, is a director.

Cumberland Valley.—Several surveys are being made by the engineers of this company for lines connecting with the Pennsylvania, and it is understood that if the roads are built at all it will be by that company. At present there is little prospect of any construction work being done this year. One survey has been made from Fort Loudon west to Mt. Dallas, Pa., 28 miles. Lines are at present being surveyed from Fort Loudon west to Chambersburg, Pa., 10 miles, and from Fannettsburg east to Newville, 20 miles.

Columbus, Shawnee & Hocking.—Starns, Hoover & Co., of Columbus, O., have the contract for grading, tunneling and trestling on the extension from Saltillo, on the Columbus and Eastern Division, to Sayres, O., on the Shawnee and Muskingum Division via Crooksville and Reed's Station, a distance of about 11 miles, all in Perry County, O.. The grading, masonry and tunnel work are about half completed, and it is expected that tracklaying will commence June 1 on about seven miles. The five bridges on the line are being built by the Smith Bridge Co., of Toledo, O. The various contracts call for the completion of the work by July 1. The extension is being built for coal traffic, and will be laid with 60-lb. steel rails.

Dallas & Oak Cliff.—The company has filed a mortgage in favor of the St. Louis Trust Co. to secure an issue of first-mortgage bonds to the amount of $400,000, the proceeds to be used to complete the road and to build branches.

Delaware, Susquehanna & Schuylkill.—Surveyors are already at work on this recently chartered road at the Oneida, Eckley and Tomhicken collieries, in the Lehigh coal region, and work will be pushed as soon as the road is located. The road is to extend from Drifton via Eckley to Dowen, Pa., 30 miles.

Duluth & Winnipeg.—Arrangements are being made for beginning construction on the northern division of this road known as the Winnipeg & Duluth and extending from Winnipeg to the international boundary. The distance from Winnipeg to Duluth is 335 miles. The city of Winnipeg will be asked to vote the company a subsidy, and the provincial government is also expected to grant a bonus. As already stated, the contract for extending the road from the present terminus at Grand Rapids, Minn., on the Mississippi River, has been awarded to Grant & Ross and Foley Bros. & Guthrie. The line will pass east of Red Lake and connect with the Winnipeg & Duluth at the Lake of the Woods. The line from Grand Rapids to this point is but 15 miles longer than an air line. The maximum grade is 15 ft. to the mile. The company will use 62-lb. rails.

East Shore Terminal Co.—This is the correct name of the company commonly known as the Charleston Belt, which proposes to build a belt road at Charleston, S. C., connecting with all the roads entering the city and with the wharves on the water front. A bill granting the company right of way through the city is now pending in the city council, but it is expected that it will be passed at once, although there is some opposition to the terms of the bill. The road will be about three miles long, and it is intended to begin its construction immediately. George C. Evans, 40 Wall street, New York City, is one of the projectors.

East Tennessee, Virginia & Georgia.—The company is stated to have decided to begin work at once on the branch from Hazelhurst southeast to Waycross, Ga., about 40 miles, the locating survey for which has been completed. A trackage agreement has been made with the Savannah Florida & Western, for the use of its tracks from Waycross to Jacksonville.

Elwood Short Line.—Swan & McAfee, of Allegheny, Pa., have the contract for building this road between North Sewickley and Rock Point, Pa., on the Pittsburgh & Western. There will be one tunnel about 700 ft. long and two bridges, one about 350 ft. long and the other about 250 ft. long. Paul Didier, of 108 Fourth avenue, Pittsburgh, is Chief Engineer.

Fort Payne & Eastern.—About eight miles of track has been laid from Fort Payne, Ala., and the grading has been completed for 10 miles. A construction company has been organized in Boston, which, it is stated, has ample capital to build the road. The route now proposed is from Guntersville, Ala., on the Tennessee River, via Fort Payne, Ala., Gainesville and Augusta, Ga., to Charleston, S. C., or Port Royal, a distance of 421 miles. The country traversed by this route is mostly a rolling plain, but for a few miles there will be some heavy mountainous work. C. O. Godfrey, of Fort Payne, is General Manager.

French Broad Valley.—The contract for the grading and tracklaying on this road has been let to James Raymond, of New York. The surveys have been completed and construction work is to begin June 20 and 100 miles of the road will be built at once. The road is to extend south from Asheville to the South Carolina State line, in Henderson County, and thence east to the Rutherford County line, where it will connect with the Seaboard and Roanoke system. The maximum grade is 50 ft. and the maximum curves are six degrees. There will be six bridges on the route. G. C. Dyott, of 52 Wall street, New York city, is President and General Manager.

Gadsden & Attala Union.—The contract for completing the grading of this road has been let to Dunn Bros., of Birmingham, Ala., and the work will be completed in a few weeks. The same firm also has the contract for tracklaying, cross-ties and bridging. Seven miles of the line will be laid with 60-lb. rails and 10 miles with 40-lb.

Grafton & Upton.—The extension from North Grafton, Mass., to Milford, eight miles was opened for traffic May 17 with ceremonies attended by a large assemblage.

Grand Trunk.—This company is having a survey and estimates made for a line to the harbor at Meaford, Ont., the station and terminus at present being on the hill at the back of the town.

Green Bay, Winona & St. Paul.—Articles of incorporation have been filed with the Secretary of State of Wisconsin for an extension of the road from a point in Brown County to Kewanee, a distance of 34 miles.

Hidalgo.—The line from Pachuca to the City of Mexico will soon be completed. The branch from Tepa to Tulancingo is under consideration.

Indiana Northern.—This company, referred to last week as the Indiana division of the Toledo & Ohio Northern, has filed its articles of incorporation in Indiana. The incorporators are: Cornelius Vanderbilt, W. K. Vanderbilt, and F. W. Vanderbilt, of New York, and John De Koven and John Newell, of Chicago. The capital stock $125,000. The road is to extend from Chesterton, Porter County, to a point in the east of the State in Steuben County, where it will connect with the Toledo & Ohio Northern.

Interoceanic.—It is expected to complete this road as far as Matamoros Izucar this month. Construction work is in progress from Matamoros to Chietla. The Veracruz division will be opened as far as Jalapa by June 15 next. Construction trains are running between Veracruz and La Antigua, a distance of 22 miles. A force of 1,800 men are reported as being at work between Jalapa and Rinconada and 1,000 between Rinconada and Veracruz. The line will probably be completed through to Veracruz by Jan. 31 next. The surveyors have completed the reconnoisance for the proposed short route to Puebla by a line through the hills, starting from a point near Ayotla and joining the old line at San Martin. The grades in certain sections will be heavy, but not so heavy as to necessitate the use of a special type of locomotive, as employed by other Mexican roads in traversing the mountains.

Johnson City & Carolina.—The contract has been let for building this road, and the contractors are preparing to sublet the work. It is a branch of the East Tennessee, Virginia & Georgia, and will be built to Embreeville, Tenn., at once.

Kansas City, Chattanooga, Augusta & Charleston.—Articles of incorporation were filed in Tennessee last week by this company, previously referred to. The charter is for a line from Kansas City to Charleston, S. C. Among the incorporators are H. Clay Evans, H. S. Chamberlain, D. P. Montague and R. A. Bowie, of Chattanooga; R. C. Cook, of Connecticut; George Little, Alabama; Clement A. Evans, Atlanta, Ga.; and J. L. Johnson and George Redmonds, Charleston, S. C.

Kansas City, Fort Smith & Southern.—Work on the southern terminus to Sulphur Springs, Ark., is in progress near Erie, McDonald County, Mo., a point about four miles north of Splitlog, the present southern terminus. The new line extends south from Erie to Beavertail Valley, passing east of Splitlog, and not connecting with that town. There will be bridges over the Elk and Cowskin rivers.

Kentucky Roads.—Bills have been introduced in the State Legislature to incorporate the following roads: Cincinnati & Kentucky Southern, Central City Mineral, and the Western, Pineville & Tennessee. The Central Valley road has had its charter amended.

Kinderhook & Hudson.—The road has been completed from Kinderhook through Nivervile to Valatie, N. Y., and trains will be running to Stuyvesant, and possibly further south, by May 31.

Lancaster & Hamden.—James H. Kyner, of Omaha, Neb.; W. M. Morris, of Grand Island, Neb.; and Kerr Bros., of Kentucky, are the principal sub-contractors on the section of this road now under contract from Lancaster to Wellston and Point Pleasant, O. About 40 miles of the line have been completed, and 500 men are now working on the rest of the division. The tracklaying is in progress, and is being done by the chief contractors, E. P. Buell & Co., of Tarlton, O. The maximum grades are one per cent. and maximum curves three degrees. There is one 400-ft. tunnel but no iron bridges. The bonds for building and equipping the line have been negotiated through E. P. Buell & Co. and the Investors Security and Accounting Co., of 15 Wall street, New York City. Samuel Effinger is Chief Engineer.

Maine Central.—The proposed line from North Stratford to a point on the Maine Central, at Hazen's Junction, N. H., is to be built by the Upper Coos road, which is now operated by the Maine Central. The surveys have been made and the contracts for grading and tracklaying on the extension will be let at once. The work is moderately heavy, with maximum grades of 1.25 per cent. and maximum curves of six degrees. There will be a number of bridges on the line with spans of about 100 ft. each. D. Williams, of North Stratford, is Chief Engineer of the Upper Coos road and has charge of the extension.

Marietta & North Georgia.—The section from White Path to Blue Ridge, Ga., 10 miles, was changed to standard gauge last week, making 31 miles between Talking Rock and Blue Ridge which have been changed.

Memphis & Atlantic.—The election held May 15 upon the proposition for the town of Houston, Miss., to subscribe $30,000 to the capital stock of the road resulted in a majority in favor of the subscription.

Mexican Pacific.—The construction work is reported to be making very satisfactory progress from Tonala. The tracklaying from that point has been completed for 25 miles.

Mexican Roads.—The Government has granted to General Sturm, of the United States, a concession for a road from the City of Mexico to the Pacific coast, via Cuernacova and Oaxaca.

Middle Georgia & Atlantic.—The section between Eatonton and Machen, Ga., has been graded, with the exception of two miles near Eatonton. The tracklaying has been completed from Machen to the Little River, about half the distance, and will probably reach Eatonton this month. The contractors are J. W. Martin & Co. Tracklaying is also in progress on the section from Eatonton to Covington, Ga., for which C. C. King & Bro., of Covington, have the contract.

Reports have been printed in some of the Georgia newspapers stating that grading had been commenced near Swainsborough, Ga., on the proposed extension to Savannah, but no definite account of this project has been published.

Midland Pacific.—The survey of this line from Pierre, N. D., on the Missouri River, has been completed for about 50 miles to Crow Lake, in Jerrauld County, northwest of Mitchell.

Mississippi River, Alabama & Chattanooga.—An election was held in Aberdeen, Miss., May 12, at which bonds to the amount of $50,000 were voted to this company as a subscription to its capital stock. The company is required to commence work at Aberdeen in July on the section between Aberdeen and Sheffield.

Monterey & Mexican Gulf.—The grading south of Linares is making rapid progress, and has been completed to near Victoria. The tracklaying will probably reach that point by Aug. 1. It is expected to have the entire line to Tampico completed by March 1, 1891.

Morristown & Cumberland Gap.—Grainger and Hamblen counties, Tenn., have voted this company subsidies of $100,000, of which Granger County voted $75,000. Morristown, Tenn., had previously voted $50,000. The road is to extend from Morristown, Tenn., to Ashland, N. C., and the grading will begin June 1 at Cumberland Gap, the contract having already been let to Allison, Shafer & Co., of Chattanooga. J. G. Martin, of Morristown, is President.

National Tehuantepec.—Work is now in progress at the Chivela Pass, on the southern end of this road. On the Salina Cruz section 44 miles are in operation, and the grading has been finished ready for tracklaying on 67 miles. The construction work at the northern or Coatzacoalcos end, under the charge of Sir Thomas Tancred, is progressing satisfactorily. Large forces of workmen are employed on both sections.

Newfoundland.—A number of tenders, some six or eight, for building the proposed government road have been laid on the table of the legislative assembly. The tenders will be considered this or next week. The majority of the tenders offer to build the line from $14,000 to $16,000 per mile.

New Roads.—A survey is being made from Concord, Contra Costa County, west to Walnut Creek, Cal., and east to San Joaquin Valley.

The citizens of Lumpkins, Ga., are having surveys made for a line from that place to Cusetta or some other point on the Columbus Southern.

New York, Bridgeport & Eastern.—It is expected that the Connecticut Railroad Commissioners will examine the location of this road on June 3. The projectors of this line are practically the same as those of the New York & Connecticut Air Line, the charter of which expired last year. The survey has been made from Greenwich, Conn., through Stamford, Darien, Norwalk, Westport, Fairfield, Bridgeport, and Stratford, in Fairfield County, and Milford, Orange and New Haven, in New Haven County. The road is about 45 miles long. The cost of construction is estimated by the engineers in charge at $5,000,502. The cost of gradation, masonry and bridges is estimated at $3,333,775; tracklaying and ballasting, $927,727; new buildings, $239,000, and right of way, $500,000. There will be a number of iron bridges and two drawbridges, one over the Saugatuck River and the other over the Housatonic River. Horace G. Scofield, of Bridgeport, Conn., is Chief Engineer.

New York, Harper's Ferry & Southern.—This company has been incorporated in West Virginia to build a road from a point in Jefferson County, along the west side of the Blue Ridge Mountains down the Shenandoah and Potomac Rivers to Frederick, Md., with branches to Charlestown to connect with the Baltimore & Ohio; to Loudoun County, Va., to connect with the Washington, Ohio & Western, and a third branch through Clark, Warren, Culpepper and Orange Counties, to connect with the Chesapeake & Ohio and Virginia Midland at Gordonsville, Va. The capital stock is $1,000,000.

New York, New Haven & Hartford.—It is stated that a force of 500 men were put at work at Saybrook, Conn., on the double tracking of the Shore Line division last week.

New York, St. Louis and Kansas City.—The Secretary of State of Illinois has granted new articles of incorporation to this company, which propcses to construct a road from a connection with the New York, Wheeling, St. Louis & Chicago of Indiana, at a point on the boundary between Indiana and Illinois, in Sullivan or Crawford County, to East St. Louis. The principal office is at East St. Louis, and the capital stock is $4,000,000. A charter for this road was filed in Illinois last March.

Niagara Falls & La Salle.—This company has been incorporated in New York by officers of the New York Central & Hudson River road to build from a connection with that line at a point near the hydraulic canal in Niagara Falls, and thence south along the Niaga a River to a point where the New York Central and Hudson River road intersects the public highway known as the River Road, near the Little River, in La Salle. The distance is about six miles. The capital stock is $60,000.

Northern Pacific.—The company has secured right of way through the city of Crookston, Minn., for an extension of the Duluth, Crookston & Northern from Crookston west about 20 miles to a point on the Duluth & Manitoba branch about five miles west of Grand Forks, N. D. The contract for building the extension of the Green River & Northern branch has been awarded to C. W. Griggs, of Tacoma, Wash. This is the line from Durham, the present terminus of the branch, to Snoqualime, Wash., in the Raging River coal fields.

Ohio River.—The directors have authorized a branch from Ravenswood, W. Va., on the Ohio River, southeast to Spencer and Greenville to a connection with one of the lines being built by the West Virginia & Pittsburgh through West Virginia. This extension is known as the Ravenswood, Glenville & Western.

Old Colony.—Work is being pushed very rapidly on the new branch from Dedham to Providence, via Walpole, Mass. The extension of the Mattapan branch to connect with the Providence division at Clarendon Hills, Mass., to form a circuit road, will soon be commenced.

Pacific Short Line.—The tracklaying on this road from South Sioux City, and Covington, Neb., has been completed west for about 60 miles through Dakota, Dixon, and Cedar counties, to a point in Pierce County, near Plainview.

Paducah, Hickman & Southern.—An officer writes that the directors desire to correspond with some responsible firm who will undertake the construction of this road from Paducah to Hickman, Ky., 48 miles through a fertile country in Western Kentucky. The projectors have no capital to put into its construction. They have obtained subscriptions amounting to about $150,000 from the towns along the route. A contract was made with the Montauk Construction Co. about a year ago to build the line, but it has done little except some preliminary work and the subsidies lapse unless the road is completed by Jan. 1 next. C. L. Randle is President and W. F. Paxton, Secretary, both of Paducah.

Paducah & Tennessee. — The contractors began work on this road at Paducah, Ky., last week. The road is to be built along the Tennessee River to Paris Tenn., 68 miles, and thence to Florence, Ala. The contract was awarded a year ago to McIntyre & Concannon, of St. Louis. Johnson & Co., of St. Louis, are the sub-contractors. The road is to be completed to the Tennessee State line, 48 miles from Paducah, by Oct. 1.

Pecos Valley.—The preliminary survey has just been completed for this road, which is projected to extend from a point on the Texas & Pacific, in Ward County, Tex., north to Eddy and Roswell, N. M., 185 miles. The road is to be built by the Pecos Irrigation and Investment Co., of Eddy, N. M., in connection with a large system of canals, also to be built by that company. It is stated that the bonds for building the line have been placed in New York. H. H. Cloud, of Eddy, N. M., is Chief Engineer.

Pennsylvania.—A new survey was recently begun from Reading southwest five miles to Mohnsville, Pa., for the proposed line to Lebanon parallel to the Philadelphia & Reading.

Work is progressing rapidly on the Trenton cut off road which is being built from Downingtown to Morrisville, Pa., 53 miles. The contractors are working night and day, and the road will probably be completed before the winter.

Peru & Detroit.—Zachariah Shrop, of St. Louis, has the contract for grading this road from Chili, on the Detroit Division of the Wabash, to Peru, Ind., on the main line of the same road, a distance of about 10 miles.

Philadelphia & Reading.—The extension of the Northeast branch to New Hope, Pa., on the Delaware River, is being pushed vigorously, and is to be finished in September. Work is in progress on it night and day, and the road-bed is nearly ready for the ties and rails from Hartsville Station to Rush Valley. A survey has been made recently from New Hope northerly along the right bank of the Delaware River towards Easton, Pa., and it is reported that the Delaware, Lackawanna & Western will use this line, if built, to gain entrance to Philadelphia over the Philadelphia & Reading tracks. The connection could be made by a short branch from Phillipsburgh, N. J., to Easton.

A survey is reported in progress for a line about 30 miles long from Williamsport north to Blossburg, Pa., the southern terminus of the Tioga branch of the New York, Lake Erie & Western. It is also reported that the latter road will build a branch about nine miles long from Lawrenceville, Pa., northwest to Erwin, west of Corning, N. Y., on its main line, and that the line from Erwin to Williamsport will be operated jointly by the two roads.

Plymouth & Middleboro.—The selectmen of Middleboro, Mass., have been asked to call a special town meeting to consider the proposition that $20,000 or $25,000 be appropriated by the town to aid this road.

Portland, Port Angeles & Victoria.—At a meeting of the trustees, held in Port Angeles, Wash., last week, a permanent organization of the company was completed, and it was ordered that a survey be begun at once for the line from Port Angeles north to Gray's Harbor. The Chief Engineer has not yet been appointed. Lewis Levy, of Port Angeles, is Vice-President.

Port Townsend & Southern.—The town of Olympia, Wash., has raised $50,000 for the Oregon Improvement Co., to be used by that company to complete the purchase of the Olympia & Chehalis Valley road and to change it to standard gauge. The road is also to be extended from Olympia north 20 miles to Union City, Wash., at the southern end of Hood's canal. The contract for this section will be let immediately. The present line between Olympia and Tenino, 15 miles, is now being changed to standard gauge. It will be operated in connection with the above road.

On the section from Port Townsend south to Quilicene, at the northern end of Hood's canal, a distance of 32 miles, 1,000 men are reported to be at work. It is expected to have the grading on this section completed by Sept. 1. Tracklaying will probably be commenced near Port Townsend early in June. The survey is now being made along Hood's canal from Quilicene south to Union City, a distance of 40 miles, but this section will probably not be completed until next winter. It is believed that the other sections will be ready for operation early in October, and the connection between Quilicene and Union City will be made by boat until the railroad is finished.

Quincy, Keokuk, Nauvoo & Fort Madison.—M. Arnold, of Hamilton, Ill., a director, claims that grading will soon be begun on this road and that it will be completed this year. The company proposes to build 35 miles of road on the Lima Levee, and to use the Toledo, Peoria & Western track between Warsaw & Hamilton, five miles. The right of way has been purchased from Hamilton north along the Mississippi River, 20 miles, to Neoto, opposite Fort Madison.

Rio Grande Western.—The company has completed the work of changing its road to standard gauge from Ogden, Utah, to Grand Junction, Colo., 346 miles. The maximum grade for 350 miles does not exceed 52 ft. to the mile, and the heaviest for 50 miles is about four per cent. The maximum curves are eight degrees. The greatest change in the roadbed is a new piece 42 miles in length, beginning at Crevassee and following the course of the Grand River.

Rome & Decatur.—The East Tennessee, Virginia & Georgia having purchased this road it assumed control of it May 10, the transfer having been made that day by the receiver. The line extends from Rome, Ga., to Attalla, Ala., 55 miles. It is proposed to extend it to Decatur, Ala., 50 miles further.

St. Louis, Kennett & Southern.—The forces now at work on the right of way at Campbell, Mo., are clearing the timber to begin grading. The clearing and grading will be done by the company's forces, and not let out to contractors. The road is to extend from Campbell, on the St Louis, Arkansas & Texas, south to Kennett, the county seat of Dunklin County, Mo., about 29 miles. It is proposed to extend the road north from Campbell to Poplar Bluff, on the St. Louis, Iron Mountain & Southern, and from Kennett south toward Memphis, Tenn. The grades are 4 ft. per mile. There will be 2,500 ft. of trestling 4 ft. high, but no iron bridges. The contracts for the rolling stock will be let Aug. 1. The projectors will furnish the money to grade the road, but it is proposed to issue bonds to complete the tracklaying and furnish the equipment. The issue will amount to $180,000, of which $80,000 will be reserved for extensions. The bonds will be negotiated through the St. Louis Trust Co. or in New York. The company anticipates no difficulty in placing the bonds, as when they will be issued it will have a graded road, deeds for the entire right of way and for 80 acres at Campbell and Kennett for station grounds. The line is located through an excellent timber district, which has not been cut on account of the difficulty in transporting the lumber to a market. The names of officers are given in another column.

San Antonio & Aransas Pass.—The preliminary survey of the extension from Houston, Tex., to Alexandria, La., a distance of 226 miles, was completed to the latter point May 10. The party consisted of three engineers and 16 men, and was in charge of J. A. Hinman, Assistant Engineer. They were in the field eight and a half months. The survey from Houston was made to the Sabine River at the State boundary and thence to Henisto and McMull Hill, and along the right bank of the Bayou Rapides and to the Texas & Pacific station in Alexandria. The line through Louisiana is much rougher than anticipated, and will necessitate the building of bridges across east and west San Jacinto, Trinity, Neuces, Sabine and Calcasieu rivers, none of them being very large.

San-de-Fuca Ship Canal & Railroad Co.—This company was recently organized to build a ship canal about one mile long from Penn's Grove across Whidby Island to the Straits of Juan-de-Fuca, and to build a system of railroads from San-de-Fuca, or Whidby Island, to the main land by the way of Big Hope Island to Seattle, Wash., and also to a connection with the Canadian Pacific. The survey now being made shows that the construction of the canal will be comparatively inexpensive, being through a natural depression and very easy material to handle. The contracts for construction will probably be let this season. W. P. Mason, Rooms 32 and 33 Scheuerman Block, Seattle, is Chief Engineer.

Savannah, Americus & Montgomery.—The locating survey for the extension from Louvale, Ga., to the Chattahochee River, in the direction of Montgomery, Ala., is now progressing and in a short time work will commence on construction. The distance from Louvale to Montgomery is about 104 miles, and the most difficult and expensive part of the work will be constructing an iron drawbridge over the Chattahochee River. The earthwork will only be ordinarily heavy. Grades will be about one per cent. The contracts for grading will be let within the next month. The company has recently purchased terminal grounds and facilities in Montgomery at an outlay of $100,000. The land purchased is centrally located in the business part of the city.

Seattle & Northern.—The tracklaying from Anacortes, on Fidalgo Island, has been finished across Swinomish Slough, over which a drawbridge has been erected. The track has reached the mainland and is now being laid toward Hamilton, on the Skagit River.

South Bound.—The contracts for grading on the first section of 38 miles north from Savannah, Ga., will be let between June 5 and 15, and the contracts for the other sections will probably be let as the location is completed. The maximum grade is one per cent. and maximum curves six degrees. The locating survey is being made by a party of 15 men north from Savannah to a point in South Carolina not yet determined, but probably Columbia or Sumter. It is claimed that 145 miles of this line will be built this year. When this northern division has been completed, a survey will be made for an extension from Savannah south to a point in Florida, probably Jacksonville. B. A. Denmark is President and George Dole Wadley is Superintendent and Chief Engineer, both with office in Savannah.

Southern California.—A survey is said to be in progress from San Bernardino through Highland and East Highland and the across Santa Ana River to Mentone, connecting at that point with the Redlands Branch. The company at present has a branch between San Bernardino and Mentone through the southern part of the San Bernardino Valley.

Southern Pacific.—Surveys are to be made in Lake County, Cal., from four different points for proposed branches. President Huntington states that the company will doubtless build this summer from Oakdale to Merced, along the foothills, but there is little other new work in prospect immediately. The connection between Santa Marguerita and Santa Barbara is a long and difficult piece of work, and business at present hardly warrants the construction of that line. There will probably not be any more work for some time on the east side line, south from Tracy. The company will make surveys for a tunnel through the Syskiyou mountains in Northern California. This to shorten the route, cutting off sharp curves and avoiding some severe grades. This tunnel will be between four and five miles long. It would make the road about 1,500 ft. lower than it is now. This route is bound to be the main line to the north.

Ten miles of the new line through the Solidad Cañon from Acton to Sangus, Cal., a distance of 22 miles, have been completed and are now being operated. Nearly 1,000 men are reported at work on the rest of the section, and the entire line will be completed in a few weeks. All the right of way has been secured.

It is been lately decided to build a cut-off in Texas where the Galveston, Harrisburg & San Antonio crosses the Pecos River between Reeves and Ward counties. The proposed change will save six miles in fifteen.

Southern & Western Air Line.—A mortgage for $1,500,000 in favor of the Central Trust Co., of New York, has been recorded in North Carolina. It is stated that S. D. Dunavant, of Knoxville, who has the contract, will soon resume the construction work at Ward's Gap, the present terminus, 22 miles from Shelby. He has until next January to complete the line to Morganton and until the following January to complete the line to its northern terminus at Cranberry, Mitchell County, near the Tennessee state line, and about 60 miles northwest of Shelby.

Tennessee & Alabama.—The charter of this company has been sold to an English company, which proposes to build furnace and rolling-mills at Stevenson, Ala., the sale having also included 110,000 acres of mineral and timber lands. The road, if built, will probably extend from Winchester, Tenn., to the Tennessee River a few miles below Stevenson. J. L. Griton, of Winchester, is General Manager.

Toledo, Canada Southern & Detroit.—This company, a part of the Michigan Central system, is the one that is building the belt road at Toledo, O., which was referred to last week as the Toledo & Michigan Belt. The new line is to extend from a connection with Wheeling & Lake Erie in North Toledo to a connection with the Michigan Central in West Toledo. Bick & Glenn, Worthington Block, Toledo, who have the contract for grading the line, have about 100 men at work. J. D. Hawks, of Detroit, Mich., is the Chief Engineer.

Toledo, Columbus & Cincinnati.—The engineers have completed the locating survey for the extension from Kenton south to Columbus, O., 52 miles, and nearly all the right of way has also been secured. The contracts for grading the line will be let in June.

Toledo & Western.—The Toledo & Chicago Air Line, which was recently chartered to build across northern Ohio and Indiana, has been consolidated with this company. Several parties of engineers are now engaged in the survey through Indiana, and two more will be placed in the field shortly. One of the directors states that the contract for grading 15 miles, between Fayette and Pioneer, O., will be let before June 1. G. G. Hadley, of Toledo, is President.

Toronto, Hamilton & Buffalo.—The Chief Engineer states that construction work will soon be commenced at Welland or Brantford, Ont., as by the commencement of the construction at one of these points the material and plant can be brought directly from the Michigan Central. The owners of real estate at Toronto also ask such

excessive prices for the right of way necessary for an entrance to the city that the company does not feel justified in purchasing at the present prices.

Tygarts Valley & Elk River.—The town of Beverley, W. Va., has subscribed $20,000 to the capital stock of this company, which was recently chartered to build a road from Bellington, Barbour County, W. Va., south along Tygarts Valley to Beverley, and thence southwest up Elk River to Addison, a distance of about 50 miles.

Union Pacific.—The reconnoisance has been completed for the projected line from Tacoma to Olympia, Wash.

Wallace & Sunset.—The survey of this new Idaho road is in progress from Wallace, up Nine Mile Creek, under Chief Engineer Stephens. It is expected that grading will begin in June.

West Shore.—A short branch will probably be built from Congress station to Rockland Lake, N. Y., near the Hudson River and at an altitude of about 700 ft. above the river.

West Virginia & Southern.—Grant District, Ritchie County, W. Va., will vote on May 28 on the proposition to issue $25,000 bonds to this company.

Wheeling & Lake Erie.—An officer of the company states that there is no certainty of the proposed line from Creston to Cleveland, O., being built. Nothing definite has been decided by the officers concerning the project.

The Chamber of Commerce of Wheeling, W. Va., has endorsed the proposition of the company asking subscription of $100,000 from the city of Wheeling for an extension of its line to that city and to provide station, grounds and other terminal facilities. The road proposes to cross the Ohio River over the recently completed Union railroad bridge.

Woonsocket & Pascoag.—It is stated that arrangements have been made to begin the construction of this road between Woonsocket, on the New York & New England, and Pascoag, R. I., about 10 miles. The road will probably be leased to the New York & New England, although at present some obstacle has arisen in the negotiations which may prevent the immediate consummation of the lease. If concluded, it will probably be for 99 years and for 30 per cent. of the gross earnings. All the capital stock has been subscribed, and two-thirds the amount has been paid in.

Zanesville Terminal.—The company has increased its capital stock to $500,000. It proposes to build a line connecting the Columbus, Shawnee & Hocking and the Cleveland & Canton, at Zanesvile, Ohio. The road is being built by the Columbus, Shawnee & Hocking, and when completed, will permit the operation of through freight and passenger business between Cleveland and Columbus via the two roads.

GENERAL RAILROAD NEWS.

Baltimore & Ohio.—The following is the statement of approximate earnings and expenses for April, 1890, as compared with April, 1889: Earnings, 1889, $1,632,135, and 1890, $1,971,316, an increase of $339,181. Expenses, 1889, $1,235,184, and 1890, $1,434,214, an increase of $196,030. Net 1889, $396,951, and 1890, $537,102, an increase of $140,151. Earnings and expenses for the seven months of the fiscal year 1889-90 compared with the same months of the fiscal year 1888-9 (April, 1890, approximated): Earnings, 1889, $11,631,865, and 1890, $13,874,013, an increase of $2,242,148; expenses, 1889, $8,548,107, and 1890, $9,635,758, an increase of $1,087,649; net, 1889, $3,083,758, and 1890, $4,238,257, an increase of $1,154,499.

Charleston & Gauley.—The company will hold a stockholders' meeting in Charleston, W. Va., on June 30 to consider the proposition for the sale of its property, franchises, etc., to the Kanawha & Michigan road, by which it is now controlled.

Chicago & Atlantic.—P. Fishback, of Indianapolis, has been apointed by the United States Circuit Court Master Commissioner to sell this road. The sale will occur Aug. 12 next, and the New York, Lake Erie & Western will probably take possession early in September.

Deadwood Central.—This company has transferred the completed road between Deadwood and Lead City, S. D., and all its rights of way and other property, to the Grand Island & Wyoming Central. The price is understood to have been $75,000.

International & Great Northern.—The second mortgage bondholders have received an offer of 90 for their bonds through the chairman of their committee, but he declines to state who made the offer. It is necessary that two-thirds of the bondholders consent to this proposition, against which there is some objection.

Kansas City & Beatrice.—Newman Erb has been appointed Receiver of this road, the company having defaulted in the payment of interest on its $400,000 bonds. The road is operated by the Kansas City, Wyandotte & Northwestern, of which Mr. Erb is also Receiver.

Kansas City & Pacific.—It is stated that the Missouri, Kansas & Texas has concluded the lease of this road for 99 years, which extends from Paola to Coffeville, Kan., a distance of 125 miles. The road is at present operated by the Missouri, Kansas & Texas. A meeting of stockholders will probably be held soon to ratify the lease and to authorize a new issue of four per cent. bonds to replace the present 6 per cent. bonds.

Lehigh Valley.—A trackage agreement has been made by the company to run its trains over the People's road from Pottsville to Minersville, Pa., five miles, for an annual rental to be not less than $3,000.

Milwaukee, Dexterville & Northern.—This road, extending from Dexterville to Lindsey, Wis., 17 miles, and the Wisconsin, Pittsville and Superior, extending from Pittsville to Dexterville, 10 miles, have been sold to the Chicago, Milwaukee & St. Paul. It is stated that that company paid $600,000 in cash and transferred property worth $250,000 for the lines.

Oregon & Trancontinental.—The Oregon Short Line and the Utah Northern has paid $2,000,000 this month to this company on account of the purchase of the Oregon Railway & Navigation Co. The company purchased $12,000,000 of the stock and had paid $7,000,000 at the beginning of the year. Collateral trust bonds are issued as fast as the stock is paid for.

St. Louis & Chicago.—Judge Gresham was applied to in Chicago this week for a modification of an order confirming the sale of the road to enable it to be transferred to the North & South Railroad Co., of Illinois. The application was contested, and the judge allowed ten days for an amicable settlement of the controversies in the matter, failing in which he will order a delivery of the property to the North & South Co. The line in dispute runs from Litchfield to Springfield and Mount Olive, Ill.

St. Louis, Iron Mountain & Southern.—The company announces by circular its purpose to retire its outstanding $7,047,000 of first mortgage bonds, maturing Jan. 1 next, and to issue in their stead a like amount of general consolidated railroad and land grant mortgage bonds, bearing five per cent. interest, and to run 40 years.

St. Louis & San Francisco.—A new issue of stock and bonds will soon be authorized. The bonds are to discharge the floating debt of the company and for additional equipment and new extensions, and the increase in the share capital is to permit the issue of bonds. The new stock will remain for the present in the treasury of the company. The issue of stock will probably be $10,000,000 increasing the capital to $40,000,000.

Tennessee & Coosa.—The directors of the Nashville, Chattanooga & St. Louis have closed their option for the purchase of this road, and will soon take possession. The road extends from Gadsden to Littleton, Ala., and is partially graded to Guntersville on the Tennessee River.

Union Pacific.—The following table shows the earnings and expenses for March and the quarter to March 31:

Month of March.	1890.	1889.	Inc. or dec.
Gross earnings	$3,399,873	$2,697,651	Inc. $702.222
Oper. expen.	2,333,592	1,807,492	Inc. 526,500
Net earnings	$1,066,281	$890,159	Inc. $126,122
Three months, Jan. 1 to March 31:			
Gross earnings	$8,191,303	$7,367,709	Inc. $823,599
Oper. expen.	6,227,867	5,280,238	Inc. 947,629
Net earnings	$1,963,441	$2,087,471	Dec. $124,0306
Oregon Short Line & Utah Northern:			
March.	1890.	1889.	
Gross earnings	$646,269	$450,153	Inc. $196,116
Oper. expen.	434.573	359,571	Inc. 75,002
Net earnings	$211,696	$90,582	Inc. $121.114

TRAFFIC.

Chicago Traffic Affairs.

CHICAGO, May 21, 1890.

The demoralization in passenger rates continues with no signs of a restoration of rates. The Chicago & Alton is quoting a rate of $7 to Denver, together with a round trip ten-day rate of $14. The Wabash and Alton both quote the $6 St. Louis rate. The Missouri Pacific put in effect the 18th a $5 rate from St. Louis to Pueblo, $6.65 to Colorado Springs and Denver; Kansas City to Omaha $2, Pueblo $4, and Denver $5.65. No attempt will be made to restore freight rates so long as passenger rates remain in this condition.

The Chicago, St. Paul & Kansas City has reduced the rate between Chicago and Des Moines from $10.15 to $3.85, the reduction to apply in both directions. This is cutting into the local territory which has been strenuously guarded by some of the Missouri River lines, and will particularly affect the Rock Island, which has gone so far as to advance its Missouri River rates in order to protect the revenue on intermediate local traffic.

The Chicago & Northwestern has made a rate between Chicago and Omaha of $5, but on through business the basing rate is $3. This reduces through rates on the Northwestern to $7 to Denver, $63 to Portland and $38 to San Francisco. The Northwestern also met the $5.20 rate of competitors to Sioux City. All these rates except the Denver rate are in effect May 22, the Denver rate taking effect May 23. The St. Paul road also met the $3 rate of its competitors between Chicago and St. Paul.

The central traffic lines have reduced the rate five cents per 100 lbs. to New York on live hogs, provisions, bulk meats, oilcake, canned meats, grease, oils, etc., all kinds of skins and hides, and in general articles taking the same classification as these. The oat rate was reduced to 20 cents. These reductions take effect May 26, and apply on carload lots.

The meeting of the joint committee of Eastern lines at New York will be held May 28. The meeting has before it for consideration the questions of the alleged cutting of east-bound freight rates and the matter of lake and rail competition. The managers of the lake lines have been invited to be present, and the session is likely to be an important and lively one.

The Canadian Pacific has applied for membership in the Central Traffic Association, in view of its entrance into Chicago next month.

The Trans-Missouri Passenger Association held a meeting here the 15th. No attempt was made to advance rates, as the discussion of the subject clearly demonstrated that it could not be done so long as rates east of the Missouri river were in their present demoralized condition.

The Western Freight Association has voted to reduce the rate on dressed beef from Omaha to Chicago from 23 cents to 18½ cents per 100 lbs., to enable the Omaha shippers to compete with the Kansas City shippers.

The Chicago, St. Paul, Minneapolis & Omaha has made a 25 cent rate on flour from St. Paul to New York, via Lake Superior and Green Bay to meet the "Soo" competition. The Omaha line accepts of this rate 5 cents to Lake Superior and 7½ cents to Green Bay.

The meeting of the Universal Classification Committee, which was to be held in Buffalo May 21, has been postponed indefinitely, pending the result of legislation at Washington.

Scalpers are cutting the rate between Chicago and New York as much as $5 to $7. It is said that one scalper has nearly 1,000 tickets over the New York, Chicago & St. Louis, and the Delaware, Lackawanna & Western, and all the scalpers are well supplied. Some of the lowest rates are over the Niagara Falls Short Line and the Baltimore & Ohio.

Traffic Notes.

On one day last week 50 passengers went from Chicago to St. Louis, via Kansas City, saving thereby $3.

The 5,000-mile tickets of the Lake Shore & Michigan Southern, are now good on 30 of its connections.

The Buffalo Car Service Association handled 19,040 cars in April, with an average detention of 1.80 days.

The reported rate of $4 between Cincinnati and Kansas City, by the Ohio & Mississippi, had no foundation in fact.

The Gulf, Colorado & Santa Fe has taken a cargo of grain from Kansas points to Galveston and shipped it by vessel to Liverpool. Galveston people dream of a four-track railroad, kept hot with corn cars.

The Interstate Commerce Commission has decided the case of Warner against the New York Central & Hudson River, concerning unjust classification of Warner's patent medicines, their rating being 1 L. C. L. and 2 C. L. The official classification was afterward changed by placing patent medicines in third class C. L. The complaint alleges that patent medicines should be classified the same as ale, beer and mineral waters, which are 3 L. C. L. and 5 C. L. The Commission holds that, in view of the much higher market value of patent medicines, and the smaller volume of traffic they supply, a higher classification than for the other articles named, in which there is much greater competition among shippers, is not unreasonable, and the classification at present in force is not shown to be unjust. It is also held that second-class rates charged on carload quantities of these goods at the time the complaint was filed were unjust.

The circular of the Missouri Railroad Commissioners on the cash fare question, alluded to last week, is as follows:

"Complaints having been made to the commissioners that several railroad companies in this state have a regulation in force by which passengers paying their fares upon trains are required to pay an amount in excess of statutory rates, and a hearing having been given all railroad companies concerned, the commissioners, after due consideration of the matter, hereby order and direct that the fares charged and collected for the transportation of passengers over any railroad in the state of Missouri must not in any case exceed the maximum fares as established by Section 2673, Revised Statutes of Missouri, 1889, whether such fares be paid upon trains or at the ticket offices of the said railroads."

Lake and Rail Rates.

The Trunk Lines Executive Committee and a number of representatives of lake transportation companies, met at New York, Tuesday, and agreed to restore the former lake and rail rates on fifth and sixth class freight, eastbound, making them 25 and 20 cents from Chicago to New York. The Central Traffic Association has been asked to take similar action.

Cattle Shippers in Trouble.

This is proving a gloomy spring for cattle shippers. They find themselves caught between the upper and the nether millstone, as it were, and many of them are slowly but surely being ground to powder. Shipments are heavier now than ever known before, and last week from the various Atlantic ports fully 20,000 head, alive and dead, were shipped abroad. It is estimated by a heavy shipper from this port, that last week's shipments represented a net loss of $250,000 to the shippers. The cause of it all is a "slump" in the London, Glasgow and Liverpool markets, and a corresponding rise on this side of the water. As compared with one year ago, there has been a fall of 75 cents per 100 lbs. in beef abroad, and a rise of $1 to $1.50 in this country. On Saturday last the quotation in the Liverpool markets was 6 cents a lb. and on this side 7½ cents.

In the face of this tremendous difference, the unhappy shippers find themselves compelled to continue sending cattle abroad, for the reason that they had engaged all the freight room they could secure up to Aug. 1 at $20 a head. Thus, if they do not ship, they will lose about $20 a head, and if they do ship they will lose nearly as much. It is a serious condition of affairs, and unless a compromise can be effected with the steamers, many of the small shippers will go to the wall soon. Some of the big men, like T. C. Eastman and Meyer Goldsmith, of this city, and Nelson Morris, of Chicago, having plenty of money, will be able to stand their losses, but not so those of limited capital. To add to their misery, they know that every head of cattle shipped to the United Kingdom only makes matters worse over there by stocking up the market. A year ago there were big profits in the business, and everybody rushed in and engaged freight ahead on every steamer, first-class or tramp, that had freight room to sell. They never dreamed of the fall across the water, and now they are besieging the steamship companies to save them by canceling their contracts.—*New York Tribune.*

Anthracite Coal Tonnage.

The following is the statement of anthracite coal shipments for the month of April, 1890, as compared with the same period last year, compiled from returns furnished by the mine operators:

	April.		
	1890.	1889.	Increase.
From Wyoming region	1,299,657	1,148,455	151,203
From Lehigh region	485,363	476,202	9,161
From Schuylkill region	794,327	649,542	144,784
Total	2,579,347	2,274,199	305,148
	Year.		
	1890.	1889.	Inc. or Dec.
From Wyoming region	4,392,201	4,783,122	D. 390,922
From Lehigh region	1,781,796	1,742,341	I. 39,454
From Schuylkill region	2,649,843	2,571,990	I. 77,853
Total	8,822,840	9,097.453	D. 273,614

The stock of coal on hand at tide-water shipping points, April 30, 1890, was 827,424 tons; on March 31, 1890, it was 992,309 tons; a decrease of 164,885 tons.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, May 17, amounted to 62,902 tons, against 68,171 tons during the preceding week, a decrease of 5,269 tons, and against 40,633 tons during the corresponding week of 1889, an increase of 22,269 tons. The proportions carried by each road were:

	W'k to May 17.		W'k to May 10.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	7,068	11.2	5,700	8.4
Wabash	1.812	2.9	2,587	3.8
Lake Shore & Michigan South.	9,341	14.8	11,648	17.1
Pitts., Ft. Wayne & Chicago	5.899	9.4	5,762	8.4
Chicago, St. Louis & Pitts.	10,426	16.6	8,748	12.8
Baltimore & Ohio	5,824	9.3	6,623	9 7
Chicago & Grand Trunk	6,463	10 3	8,343	12 2
New York, Chic. & St. Louis	8,640	13.7	11.226	16.5
Chicago & Atlantic	7,419	11.8	7,534	11.1
Total	62,902	100 0	68,171	100.0

Of the above shipments 2,345 tons were flour, 29,008 tons grain, 2,350 tons millstuffs, 5,346 tons cured meats, 1,375 tons lard, 9,680 tons dressed beef, 1,523 tons butter, 1,659 tons hides, 141 tons wool and 7,124 tons lumber. The three Vanderbilt lines carried 39.7 per cent. of all the business, while the two Pennsylvania lines carried out 26 per cent.